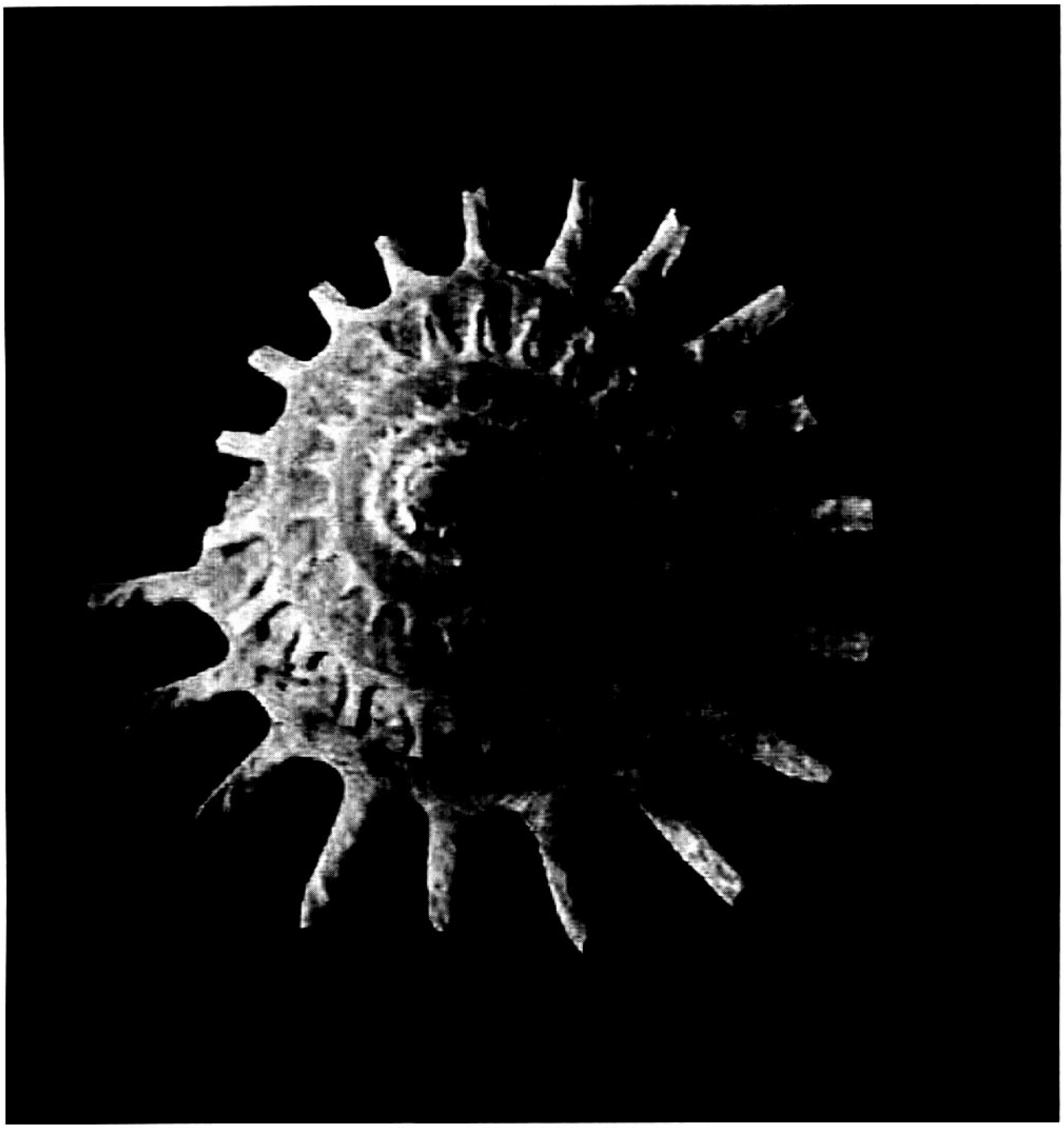
# of Sea and Shore



A publication dedicated to seashells, sea life, natural history & the pursuit of knowledge.

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OUR COVERS: *Stellaria solaris* (Linné, 1767), specimen from Vietnam - see article page 21
Cover designed by Peter Gunn. Photograph by Tom Rice. Specimen from Dr. N. N. Trach.

From the Editor's Desk:

Several apologies to make - first that this issue is a bit late in reaching you - but, you've probably become used to that by now.

Secondly, I must offer sincere apologies to someone who was very generous in donating the specimens of the Magnificent Rift Clam to our museum which we illustrated in the last issue, for somehow not acknowledging his donation in the article on our 25th Anniversary. Paul Kanner of Los Angeles had received the specimen, but felt that it needed to be displayed somewhere other than in his own collection, so that an optimum number of people might enjoy it - and at the suggestion of Charles Cardin, he donated it to Of Sea and Shore Museum where it has been proudly displayed since. Thanks Paul, and again my apology for the oversight.

With that, I must get to work on the Summer issue.

TOM

IN MEMORIAM

Leslie Easland
Charles Glass
Vivienne Smith

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EDITOR: TOM RICE

IN THIS ISSUE -

TWENTY-THREE YEARS OF SIFTING SAND

Kay Pope

It began in Puerto Rico in 1972 when a friend who had an engineering business had an iron frame for a dredge welded for me. It was made to a third of the size suggested in Warmke and Abbott's Caribbean Seashells. All I had to do was to bind on a metal mesh bag to the rectangular frame.

We tried out the dredge behind the reef on the south side of Culebra, Puerto Rico, towing it behind our eleven foot dingy. We quickly discovered how heavy the dredge becomes when it is full of sand.

We needed a larger boat with lifting gear! Since we lived on board a 54-foot ketch, having a larger tender towing astern when we sailed from one island to the next, sometimes to windward, was out of the question, since it would slow us down too much. Our efforts with the dredge had been disappointing. We had found a few *Eratoidea margarita* Kiener, *Trigonostoma rugosum* Linné and a bivalve, a member of the *Macoma* family, *Cymatoica orientalis* Dall. These were new finds, but they involved a great deal of work.

We had moved on to the British Virgin islands in 1974 when Dudley, my husband, suggested a handnet would be much more practical. He found a stout handle and a piece of reinforcing rod on a nearby building site, bent it into a rectangular shape (10 inches by 6 inches), and fitted the two ends of the rod, which he bent perpendicularly from the rectangle, either side of the wooden handle. He then lashed the rod to the handle with strong nylon whipping line that we already had on the boat. I then made a mesh bag from nylon mosquito netting and bound it to the frame with thick waxed sail sewing thread.

Although I have had to change the mesh bag a few times over the years, the handle and R-rod are still the original.

Our collection of Caribbean shells has been steadily growing from the time we discovered shells on the beach in Grenada in 1966. But I could see from Warmke and Abbott's book, there were many shells we had not yet found that measured less than a centimetre.

We found the sand bottom around Tortola and Virgin Gorda was really rich with microshells. There were *Dentalium* and *Turbonilla* we had never seen before, and the Turrids, Epitoniidae, *Mitrella* and Nassarinas that had been so elusive. Some of the Columbellidae family and Turridae I had found in hermit crab colonies, but now a whole new world of shelling opened up for us: at last I was finding small cones, mitres, terebras, rissoinas, marginellas and cerithiopsis.

My husband, Dudley, still liked to collect the larger shells while I did my sieving. Diving from six to fifteen feet to scoop sand around the corals and soft gorgonians, and into little cave-like openings in the reefs were particularly good for exciting new species of shells that we had not seen before. Between each scoop I shake all the sand out through the mesh of the net, leaving a small amount of pieces of coral and, hopefully, shells. I then tip these leavings into a plastic bag in our dinghy to be taken back on board and spread out on a flat dish to dry. Later, after twenty-four hours or so, I go through the leavings with tweezers and a magnifying glass.

On one particular trip we were diving outside a reef off the west coast of Virgin Gorda. It was at least thirty feet deep and there was no way I could get down to the bottom to fill my net. So I gave it to my husband to fill for me. He came back with it filled absolutely to the brim, which I never manage to do as I can only stay down long enough to partly fill it!

However, I took the net and began madly shaking it to sieve out the excess sand, to leave the usual small bits of coral and shells in the bottom. Dudley, in the meantime, had really exerted himself to fill the net so full and was getting his breath back. When he had recovered he looked around and could not see me until, looking down into the water, saw me slowly descending, still shaking the net and apparently unaware I was a good twelve feet or so under the surface!

I must say I was relieved when he appeared and took the net from me, as I was determined not to let it go!

But in that one filling, we had found some small, but lovely alive *Terebra glossema* Schwengel. They were a bright golden colour; a larger one I had found in a hermit crab colony was pale beige and they

appear to fade when dead and in shallow water. I was not to find any more until we were in St. Martin and living ashore in Marigot in 1988.

Here in St. Martin at that time the port authorities were dredging Gallis Bay on the east side of Marigot Bay to make a deep water harbour. There was an enormous pile of dredgings on the shore. So during the winters for the next three years, I was sieving sand from the pile with my net and dumping the leavings in a bucket to go-through at home.

This was a rich treasure trove of shells, some of which I had not found before, since the sand came from deeper water than I usually sieved. I found *Anachis pretri* Duclos, *Mitrella lunata* Say, *Nassarina minor* C.B. Adams, *N. monilifera* Sowerby, the latter were also plentiful in Virgin Gorda. Also from this pile I found my first *Acteon candens* Rehder, *Trivia antillarum* Schilder, *Pusia (Vexillum) laterculatum* Sowerby, *P. sykesi* Melvill, *Aesopus stearnsi* Tryon and two other species of *Aesopus* that I have not been able to identify.

In the British Virgin islands we had found two species of *Dentalium*: the common *D. antillarum* d'Orbigny and the rarer *D. semistriolatum* Guilding. We had also found one species of *Cadulus*: *C. quadridentatus* Dall. Here in St. Martin I have sieved up *Dentalium calamus* Dall and three other species of *Cadulus*: *C. acus* Dall, *C. carolinensis* Bush and *C. tetrodon* Pilsbry and Sharp.

All in all, sieving has been a very rewarding way to find shells. I am still busy at it, although twenty-three years older I am not getting down so deep nor able to fill my net quite so much either!

Since Hurricane Luis hit St. Martin in early September 1995, sieving for microshells has been very poor, with one notable exception during the summer of 1996. A bay on the northeast coast of the island suddenly became accessible. It is called Baie des Grandes Cayes because the islands of Tintamarre and Pinels can be seen from the beach. But calling it "Large Islands Bay" is rather a mouthful, so my daughter and I call it Wilderness because we share it with only an osprey and cactus. There are a few trees and bushes on the hills surrounding the bay, rising to about six hundred feet. But mostly it is rolling, wind-swept grassland as it is exposed to the full force of the trade winds.

Until recently, it was at least a mile hike along a narrow track. But the French authorities needed a new site for the municiple rubbish dump. So they scraped a road through the bush with a bulldozer to the far end of the bay and then the rough road turns left into an almost enclosed valley. All that is visible of the dump from the beach is a small plume of smoke coming over the hill.

The bay is enclosed by a reef and has secondary reefs inside which, at places, almost reach the shore. The best time to visit Wilderness is from May to October when the summer trade winds are light and there isn't too much surf coming over the outer reefs from the Atlantic Ocean.

Here was a whole new areas to explore and sieve! As elsewhere, around the island since the hurricane, the shells I find are dead here too. But many are very freshly dead. In an hour's snorkeling and sieving I have found thirty-five or more different species, while on the est side from Marigot to Grand Case, I am only finding seven or eight species at the moment.

The most exciting find has been *Volvarina lactea* (Kiener, 1841). I had found two juvenile specimens in Baie l'Embouchure about ten years ago, which were a light straw colour with a narrow, darker band halfway up the body whorl. Until now I was not too sure what they were.

Volvarina lactea is described in my reference books as being a milky white colour. But I have found them while sieving at Wilderness with the colour ranging from golden straw becoming paler until opaque white to solid porcelaine white, the more mature the shell may be. The freshly dead specimens have a darker band of orange at the middle of the body whorl, but this fades very quickly. But it appears they are a golden colour when alive and depending on how long they have been dead, they eventually turn white.

Another member of the Marginellidae family does the same thing: this is *Dentimargo reducta* (Bavay, 1922). I found a few alive at the western end of Simson Bay in 1986. Two had a golden band at the middle of the body whorl, while the rest were a solid ivory colour. But after a while the golden band disappeared.

I have sent a couple specimens of this *Volvarina* to a friend who works at the Museum of Zoology at the University of Amsterdam to be sure my identification is correct. But the spire is very distinctive and just like that of *V. lactea*. The spire is short and blunt and as the shell becomes mature, the varix gradually overlaps the aperture side of the spire. The body whorl is oblong and the lip gradually becomes incurved with maturity, constricting the aperture. The largest specimens are 9 mm and the apertures are 8

mm. Since I collected them last summer, they have all faded and only two still have a faint darker band still showing.

Below I give a complete checklist of the microshells I sieved during the four months at Wilderness last summer. We also found a freshly dead *Cypraea cinerea* Gmelin, 1791, and a small *Vasum muricatum* Born, 1778. There were a few live *Astraea caelata* (Gmelin, 1791) and *A. tuber* (Linné, 1758); dead *Turbo castanea* Gmelin, 1791 and dead *Tegula fasciata* (Born, 1778).

Diodora minuta Lamarck, 1822
D. arcuata Sowerby, 1862
Euchelus guttarosea Dall, 1889
Synaptocochlea picta d'Orbigny, 1842
Arene variabilis Dall, 1889
Pseudostomatella coccinea A. Adams, 1850
Tricolia tessellata Potiez & Michaud, 1838
T. affinis C.B. Adams, 1850
T. adamsi Philippi, 1853
T. bella M. Smith, 1937
Rissoina minor C.B. Adams, 1850
R. bryerea Montagu, 1803
Trifora casta Hinds, 1843
T. turristhomae Holten, 1802
Epitonium novangliae COuthouy, 1838
Hipponix antiquatus Linné, 1767
Dentimargo sulcata d'Orbigny, 1842
Volvarina albolineata d'Orbigny, 1842
V. heterozona Jousseaume, 1857
V. lactea Kiener, 1841
Hyalina pallida Linné, 1758
Gibberula lavalleana d'Orbigny, 1842
Oliva reticularis Lamarck, 1810
4 live specimens in one small area
Olivella floralia Duclos, 1853
Zebina browniana d'Orbigny, 1842
Smaragdia viridis viridemaris Maury, 1917
Nassarius antillarum d'Orbigny, 1842
Anachis pulchella Blainville, 1829
Nassarina pygmaea C.B. Adams, 1850
Mangelia quadrilineata C.B. Adams, 1850
Pleurotoma maculata C.B. Adams, 1850
Crassispira pellisphocae Reeve, 1845
Acteocina recta d'Orbigny, 1842
Atys riiseana Mörch, 1875
Pyramidella crenulata Holmes, 1859
Odostomia ovuloides C.B. Adams, 1850
Barbatia cancellaria lamarck, 1819
Codakia orbicularis Linné, 1758
C. costata d'Orbigny, 1842

STATE SHELLS

The following listing of "Official State Shells" is from the Jacksonville Shell Club's home page on the World Wide Web. Dates in ( ) indicate when the shell was designated as the State Shell.

North Carolina (1965)
Phalium granulatum, Scotch Bonnet

Florida (1969)
Pleuroploca gigantea, Florida Horse Conch

Mississippi (1974)
Crassostrea virginica, Eastern American Oyster

Maryland (1984)
Ecphora quadricostata, Four-ribbed Ecphora

South Carolina (1984)
Oliva sayana, Lettered Olive

Texas (1987)
Busycon perversum pulleyi, Pulley's Perverse Whelk

Georgia (1987)
Busycon carica eliceans, Kiener's Whelk

Massachusetts (1987)
Neptunea lytata decemcostata, New England Whelk

Rhode Island (1987)
Mercenaria mercenaria, Northern Quahog

New York (1989)
Argopecten irradians irradians, Atlantic Bay Scallop

Oregon (1989)
Fusitriton oregonensis, Oregon Triton

Connecticut (1989)
Crassostrea virginica, Eastern American Oyster

Alabama (1990)
Scaphella junonia johnstonae, Junonia

New Jersey (1995)
Busycon carica, Knobbed Whelk

Some More Cases of Uneven Distribution Along the Dutch Coast

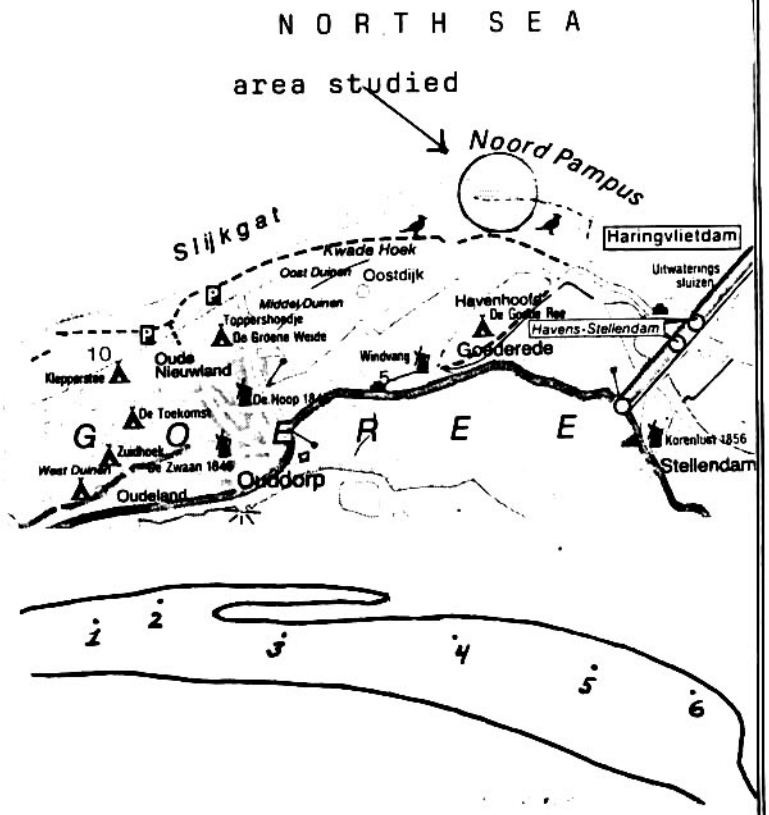
Willem Krommenhoek

In the Fall 1997 issue of this magazine, I presented an example of uneven distribution of right and left valves of the common sand gaper (*Mya arenaria* L.) along a beach in a natural reserve in southwest Holland, about 50 km from Rotterdam. Most of the data were obtained in May 1997, and I wondered how this distribution would be in winter. Therefore, in December 1997 I again visited the same area and once more determined the percentage of left valves (the ones with a small-finger sized tooth-like projection) at the same spots as I did in May.

This time the sample comprised 419 specimens of gaper valves. The results are presented in Fig. 1. Most striking is the fact that at the eastern part of the beach the percentage of left valves was doubled or tripled compared to May, reaching a maximum of 42%. At the location where the highest percentage of left valves was found in May there was no material washed up in December!

At the same time I would like to report another example of changes in washed up material with time. In July 1996 I collected on the same beach between locations 5 and 6 a number (115) of dorsal plates of squids (*Sepia sp.*). I measured their length and did the same with 145 specimens found in September of the same year at that place. The results are given in Fig. 2. Whereas among the plates found in July a majority measured about 19 cm, this measurement was only 9 cm in September. However, in both samples it is obvious that two classes of squid size are present. The majority of specimens found in July belonged to the bigger type, in September to the smaller type. Unfortunately, this development could not be followed any further as during later visits in 1996 and additional visits in May, July and December no squid remains were found.

Fig. 1



May:	2	12	26	8	7	19
Dec:	6	4	-	7	27	42

Top: Kwade Hoek Beach, SW Holland. Over a distance of two kilometers in the encircled part, at regular intervals the ratio left:right valves of the common gaper (*Mya arenaria* L.) was established in May and December 1997. Bottom: Detailed map of the encircled section of beach with locations of collecting and the percentages of left valves.

Literature

Krommenhoek, W. 1997. An Example of Uneven Distribution of right and left valves of the common sand gaper, *Mya arenaria* L., along the Dutch coast. Of Sea and Shore 20:3:167-68.

Note: Figure 2 is at bottom of page 8.

Address:
Dr. Letteplein 1
3731 JR De Bilt, Holland

Shell Shows, etc.

May 2-3. **VII Belgium International Shell Show** Aarschot, Belgium. R. de Roover; Vorsterslaan 7; B-2180 Ekeren-Donk, Belgium. (3) 644-3429

July 11 & 12, 1998. **Keppel Bay Shell Show.** Information: P.O. Box 5166; Rockhampton Mail Centre; Queensland 4702, Australia

July 19-23. **Conchologists of America** Orlando, Florida. Linda Koestel; 1072 Grizzly Ct.; Apopka, FL 32712-3059. (407) 880-1176. E-mail: lkoestel@magic.net

July 20-21. **XVIIème Salon International du Coquillage.** Lutry, Switzerland. Dr. Ted W. Baer; CH-1602 La Croix, Switzerland. (21) 791-3771; fax: 792-1411

July 25-31, 1998. **World Congress of Malacology.** Washington, D.C. The 13th International Malacological Congress of Unitas Malacologia and the 64th Annual Meeting of the American Malacological Union, together with other participating malacological organizations. Contact: Dr. Rüdiger Bieler; Dept. Zoology, Field Museum of Natural History; Roosevelt Rd. & Lake Shore Dr.; Chicago, IL 60605-2496

Sept. 22-26. **XII Congreso Nacional de Malacologia** Málaga, Spain. Secretaria. XII Congreso Nacional de Malacologia, Departmento de Biologia Animal, Facultad de Ciencias, Universidad de Málaga, 29071 - Málaga, España. fax: (95) 2132000. E-mail: casanova@ccuma.uma.es

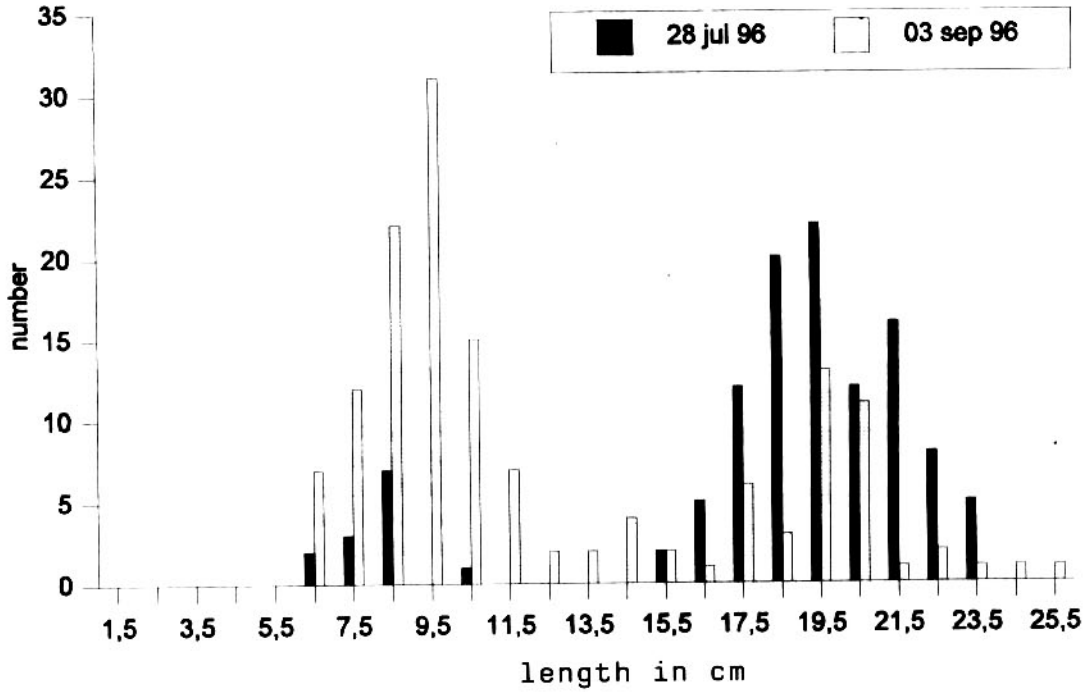
October 2-5. **4th Congresso della Societa Italiana di Malacologia.** Museo Zoologico "La Specola", Tribuna di Galileo, Firenze, Italy. Segretaria organizzativa e scientifica Dott. Maddalena Giuggioli; Museo Zoologico "La Specola"; Via Romana, 17; 50125 Firenze, Italy. (055) 2288266 or 2288255; fax: 055/ 225325. E-mail: specola@specola.unifi.it

October 31. **Annual Shell Show, British Shell Collectors Club.** Napier Hall, Hide Place, London. Kevin Brown; 12 Grainger Road; Iselworth, Middlesex TW7 6PQ UK. (44) 181-568-8333.

Nov. 11-13. **III Taller de Biodiversidad** Museo de Historia Natural Tomas Romay. Santiago de Cuba. David Maceira F., Malacologist BIOECO, Centro de Ecosistemas y Biodiversidad. Museo de Historia Natural "Tomas Romay", Enramadas #601 esq. Barnada, Santiago de Cuba 90100, Cuba. email david@bioeco.ciges.inf.cu

continued on page 46

Fig. 2



Size distribution of dorsal plates of squids found on Kwade Hoek Beach, SW Holland in July and September, 1996. No more squid remains were found when this location was visited in October 1996 or May, July and December, 1997.

SOLOMON'S TREASURE

E. Shary Almasi

Photographs by Maxine Haun

As there have been several fine articles written in Of Sea and Shore, as well as in American Conchologist I felt a great reluctance to write yet another on shelling the numerous and beautiful Solomon Islands. I was "persuaded" to do so at the request of a few of my fellow travelers. One, Homer Rhode of Ramrod Key, Florida, said that our trip had turned out to be one of the "richest" he had ever experienced and Glenn Duffy, our intrepid guide, totally agrees with Homer. So, with the promise from the both of them that they would supply me with names of the unusual shells they gathered, I agreed to write about our trip. You will find that list at the end of this article.

On our first day we travelled from Los Angeles to Fiji, arriving in Nadi early in the morning. As we had an overnight layover in Nadi before flying to Honiara, we headed into the city to sightsee and visit the market. My traveling companion, Trevor Roberts, purchased various bivalves at the market and shared them with a few of us. The market was quite large and very busy. We sampled some seaweed that looked like tiny sea grapes. We found all sorts of vegetables, fruits and fish offered for sale.

The next morning we took a 90-minute flight from Nadi to Honiara on Guadalcanal. Arriving at Henderson Field, we found it hot and dusty, with no comfortable place to rest for the 3 hours until out next flight. This airfield had seen much activity during World War II, and there are memorials to U.S. servicemen inside the airport and on the grounds. Finally we flew on to Munda in an 18-passenger Twin Otter - altitude 8,000 feet. We flew over hundreds of islands and atolls. On some of the larger islands one could see red dirt logging roads snaking through the jungle. Piles of logs here and there looked thrown about like toothpicks. We were told that Malaysian companies are coming in and buying logging rights from the chiefs of local tribes. The chief are getting rich and the land and tribes are losing precious timber.

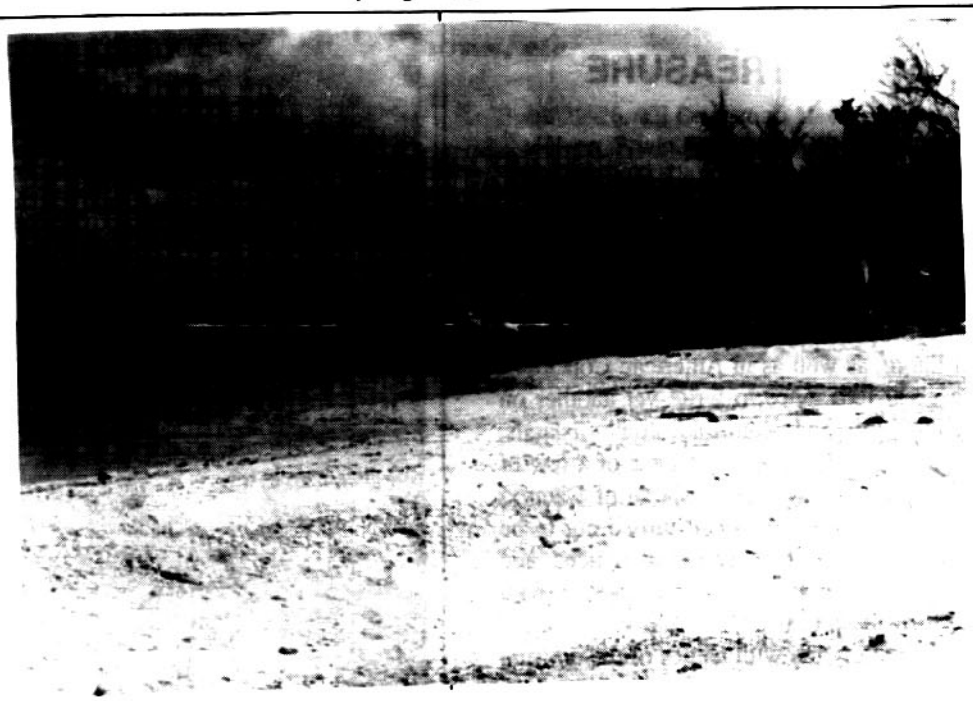
After 50 minutes we landed on Seghe, a small island that sports a grass runway. Picked up 3 passengers ... as there were already 16 of us, we were a bit surprised to pick up 3 more bodies for our little 18-passenger plane!

Now what species do you suppose this is?

From Seghe it was another 18 minutes to Munda. Munda is a fair sized island in the New Georgia Group, with small villages and a landing strip; a few scattered shops (mostly in people's homes) and one decent-sized hotel, the Agnes Lodge, located at the water's edge and very picturesque.

On our first morning Homer introduced me to the Hot Bread Kitchen, a local bakery, and we bought rolls, scones and coconut buns. Six of us were located in three rooms in the older building at the hotel - up on the second floor where a veranda ran the length of the building. There were bamboo chairs, tables and a couch on the veranda. Mary Wold, Betty Jean Piech and Ann and Homer Rhode joined Trevor and I for breakfast of coffee and fresh buns. From our vantage point on the veranda we watched as local people came by boat to set up for the market, which was right next door to the Lodge. Besides the lovely view we also had nice breezes.

After breakfast we would head out to the various small islands and snorkel in shallow water. The areas



The "Sanibel Stoop", as performed in the Solomons.

were rich with shells. We found all the usual species and just enough of the unique to spur us on each day! What made it especially nice for a group of shellers was that each area we travelled to seemed to have more than one habitat to "cover".

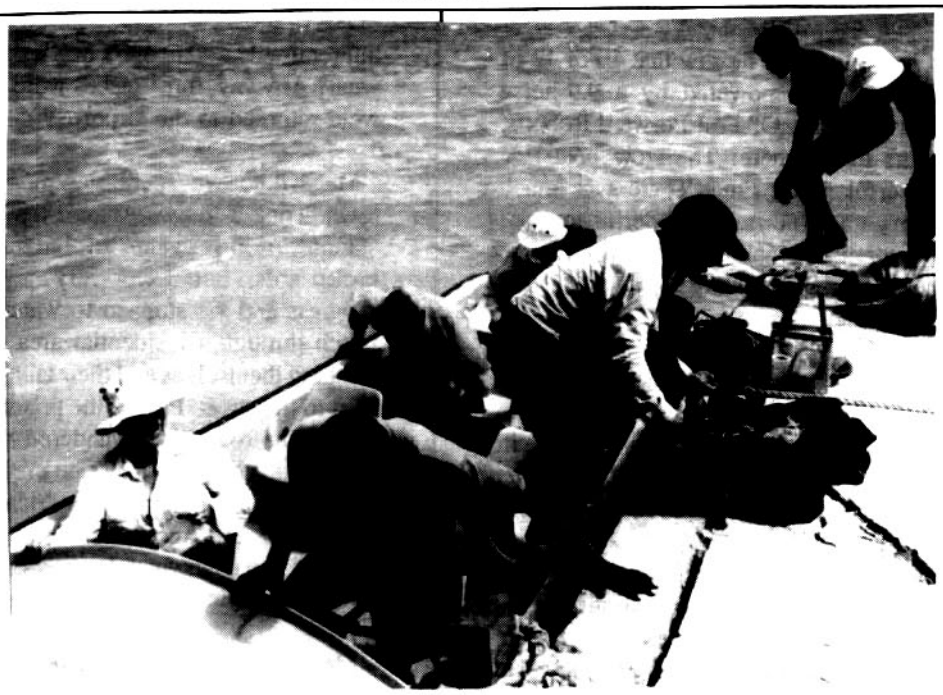
On most days a few of us would be in the water for four or more hours. The beachcombers - Ron Bender (of our Pacific Northwest Shell Club), Mary Payne and Ruth Innes, Maxine Haun and Derry Sperling did most of the reef-walking. Grant Baldwin and Ruth Sperling divided their time between beach and the water. Al Schilling, Homer and Ann, Trevor, Mary Wold, Glenn and I pretty much kept to the water. Neil Fahey was along to collect land snails and, on several occasions, Homer joined him in that endeavor.

Late one day, Glenn had arranged for a "walkabout" with Leve, a local guide. It was a very nice walk through the village where we watched young girls doing laundry. Faucets were out by the road and the girls come to the dirt road to bathe and to wash. At one point a whole flock of very bright red-and-yellow lorikeets flew over and landed in palm trees. They were gorgeous. Would have taken the walk just to see them! We ended at someone's home, where several locals brought out shells to sell. Several of our group made purchases - Trevor bought two lovely golden *Cypraea arabica*. Rode home in the back of a pickup ... dodging low tree branches and bouncing about. Great fun.

At dinner that night we sat with two nurses - man and woman - from Australia, employed by the World Bank. They were doing a midwifery project for the Solomon Islanders, traveling from island to island, visiting the local hospitals. We were also joined by the owner of the Hot Bread Kitchen. Turns out he owns several of them and comes around periodically to check on them. Good dinner conversation. Later we were entertained by dancers - young men painted with red ocher and white ... reminded us of the dancers in Papua New Guinea (up the Sepik River, and actually not so very far away).

One day Trevor lost his snorkel and mask and was a bit frantic, but I did some slow zig-zagging on the way back to the shade and found it. Homer found *Aspella producta, Pterynotus tripterus* and *Favartia brevicula* and Ann found the most beautiful *Haustellum haustellum* I've ever laid eyes on. I found a wonderful tiny *Natica suffusa* with purple markings and also - new to me - *Oliva parkinsoni*. On one stretch of beach, Ron found a near-perfect Chambered Nautilus. This made him a very happy man! Ron is fairly new to shelling and he had the great good luck to room with Al - shelling with Schilling ...who is an old pro from the Philadelphia Shell Club. Most congenial group ever. (Do I say this about every trip?)

Saturday - this is Seventh Day Adventist land so there is no market today. All's quiet. Trevor and Mary



Our guide, Shary, Grant and Betty Jean (to the rear). Trevor climbing out while Glenn looks over the "goodies".

walk down and pick up fruit in the market each morning - but not today. The bakery had cream buns though. We made a late start, but it was another beautiful day for shelling. Again, different habitats, but with work, it was productive. A beautiful *Hydatina physis* under a rock and deep in sand. What a delight! A perfect *Conus marmoreus* and then found a *Cypraea tigris* nestling in a soft grey ruffled coral. Can't figure out how it got there? We are getting very picky about cones ... we've seen so many! Just now Betty Jean is on the veranda, working on shells and tossing insults back and forth to one and all, her grey hair flying in the breeze whilst complaining that our end of the porch gets all the sun and why am I writing when there is so much to do?

This has been a really great week. Picturing Betty Jean on the beach, black tights with print bathing suit and a white hat perched sailor-style on her head ... bent nearly double, all 4'8" of her, with her collecting bag clutched in her hand, the better to find that special shell. An inspiring sight! Orchids everywhere, bougainvillea, afternoon breezes, tinted azure waters, the market, bakery, peace. Watching Homer and Neil starting out in the morning on their search for the elusive land snail ... they were usually accompanied by a couple of young local guides. Too far from home to worry or care what the world was up to and, yet, we still received the news of Princess Diana's death, and, for the next few days, you could hear the occasional television or radio broadcast giving updated news regarding her accident.

On another evening, after dinner, about 15 Solomon Islanders sang for us. Two guitars plus a musical instrument the likes of which I had never seen. It looked like a monstrous tripe pan pipe - the longest of the three levels sat flat on the floor. Pipes were bamboo, and up to 6 inches in diameter, of varying length with the longest being about 11-12 feet long. The player sat on the top layer and hit the ends of the bamboo pipes with a mitt which looked something like a bedroom slipper. This produced deep deep baritone notes. It would be a beast to play!

After a week on Munda we headed for Ghizo Island, a short 15 minute flight away. We landed on an island that only serves as an airstrip and then boated to the Gizo Hotel in Gizo Town. The dining room was a sheller's dream come true. There were *Charonia tritonis* everywhere. Probably 40-50. It's no wonder they are endangered.

We settled into rooms that look across the courtyard to a huge mango tree. Late in the afternoon we watched the green and yellow lorikeets eating mangos til a man from the hotel climbed the tree to pick a few fruits and to frighten the birds away. We soon learned that as soon as a mango dropped, a young person from the hotel would race out to pick up the fruit. Often there was more than one person vying for that mango!

On our first morning out from Ghizo, we took a slow ride to our collecting area, Mbimbrusi Island.

Trevor almost had a fit when he saw that 10 or 12 of us were riding in a boat powered by a 9.9-horse motor. Grumble, grumble. Ol' Fast Forward Roberts. It took 1¼ hours to get there! The slow boat ride became a wonderful social time. There was much kidding and Derry and Ruth told wonderful jokes! I began keeping a log, just of jokes! Glenn found a live *Phyllocoma convoluta* and this area, too, gave us a choice of different habitats.

Later on Olasana Island, a lovely shelling place - shallow with a deep drop-off about 100 feet out - we found nice mitres, tiny *Cymatium mundumon* in staghorn coral. Ann found a wonderful *Haustellum haustellum* - the largest and loveliest color I've ever seen. I spotted 45 cuttlefish on the edge of the drop-off; all line up facing me as I swan along. Really like those guys - they protect their territory. Grant lost his collecting jar with a marvelous Murex in it, but lo, Betty Jean found it for him later in they day! He wasn't as lucky when he lost his jar the second time!

Each day ran into the next. One day I found a live *Harpa amouretta* and Ann found a large *Harpa major*. She also found a live *Epitonium* new to Glenn and Homer. One morning on our way to the collecting area our boat motor almost conked out, so 12 of us piled into the second boat. This location turned out to be a sand beach again with several types of habitat. It was truly *Terebra* City. We visited this area twice and also had wonderful results with Trevor's small hand dredge - not that he let me use it for very long! Homer and Ann did well with their dredge too.

One afternoon, after we had returned to the hotel, while I was walking back to the room, I encountered Homer tearing down the stairs and around the building. He had heard a mango drop and wanted to get to it first! Then another dropped and off went Trevor. Later I overhead someone say to Betty Jean, "You didn't get much today"? Betty Jean answered emphatically, "I got even less than that!" By the end of our week the hotel staff had nearly cleaned out the mango, tree, but the lorikeets still graced us with an occasional appearance.

On the last collecting morning we tried a location that Emilio Garcia had recommended to Glenn and it was quite good. Found *Ethminolia stearnsii*, *Cypraea caurica* and the wonderful cones we were finding almost everywhere.

The Longest Day. On the morning of our last day, thirteen of our bags were sent out to the airport for an earlier flight. Later we found that the plane took off, but returned as someone's bag was stinking! Of, guess what? Anyway, three pieces were sent on and the rest were returned to the airport.

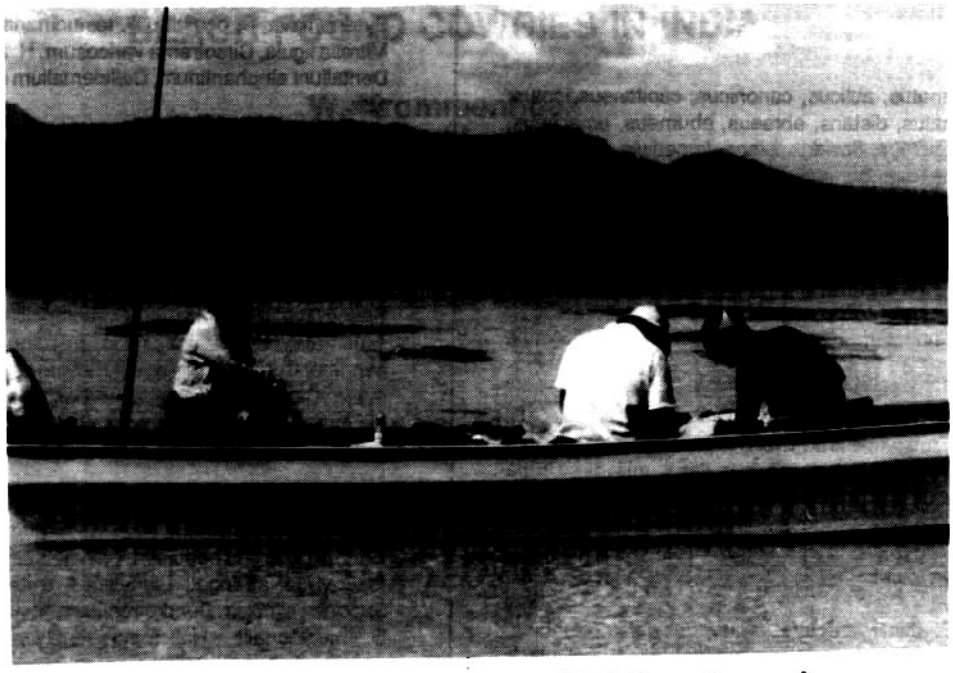
Meanwhile we spent the morning exploring the town. Took a long walk past the hospital and police station. A girls' game of basketball (they had no backboards, but were very good shots) was in progress and we stopped to watch. We followed the beach through a residential area where people were washing themselves and their laundry, again at faucets next to the street. Passed the prison and came near the end of the road, then wandered back to town where we bought meatpies and "ice cream" which was sort of a popsicle-shape in a cylindrical plastic bag. Looks like a popsicle, but tastes creamy and is made with slivered ice. Watched lorikeets, but there were no mangoes left in the tree for them, or us!

Men fished in front of the hotel, throwing their nets so gracefully. We've watched them each morning as we've waited to leave in our boats and they do quite well catching a smelt-size fish.

The market was busy - papaya, banana, coconut, betelnut, cabbage, several varieties of greens, green beans, squash, eggplant, plantain, plus some cakes (not tasty!), crepes and deep-fried rolls filled with ramen noodles and green beans and a jelly-like pasta square filled with red beans which wasn't too bad. No one looks hungry here.

Finally, in the early afternoon, we headed for our boats and the airport. Four of us went in a second boat with all the luggage and, darned if the motor didn't die four times! This isn't a laughing matter when you are travelling along a reef and find yourself getting ready to "abandon ship" as the boat drifts into that reef! But we finally docked and walked up to the airport ...And a problem was brewing.

A group of divers were there from a dive shop in Gizo. The divemaster, who seems to be a bit of a local celebrity, was seeing his diver "clients" off. He has an obvious dislike for shellers. He was standing with an official who insisted we open our bags so he could look for shells. They started on Mary's duffel and eventually confiscated all her shells! Later we learned that Mary had actually opened her bags for these officials earlier in the day after the morning plane had returned to the airstrip. They had found everything in order. Then the Sperlings' bags were opened and all shells were confiscated from their bags as well as from Ron Bender's. Grant's very nice stainless, hand-built hand dredge was also confiscated. The divermaster was busy telling the official to be sure to look in all plastic boxes as "that was where



If you could only see just how BLUE the waters are!

shellers kept their shells". He was deriving a good deal of pleasure from our obvious discomfort. By this time, the first plane had arrived and filled with divers. A second plane landed and six more divers got aboard. The infamous divemaster left and as soon as he was gone the search ended! The official hauled the shells (and Grant's nice stainless steel hand dredge) off amid much quiet protest. A tenacious Glenn Duffy followed them, telling us that if he didn't return before our plane took off, we were to go on to Honiara alone.

We were one dejected group of people. As our small plane taxied up to the airport, Glenn appeared - and he had the confiscated shells! There was a great rush to put them away and run to the plane. A few tears were shed and much hugging and thank you's were passed to Glenn.

He later told us that he went to the police station, escorted by a man from the hotel, who had been helping us at the airport. The young man ran to get the Gizo Hotel manager and he immediately came along to the station and tried to help smooth things over with the officials. Eventually all shells were returned, as was the hand dredge.

Glenn dealt with a deputy of Fish and Wildlife who is a part of the Royal Solomon police system. The problem is that, while it is known that you can-not take *Cassis cornutus, Tridacna, Turbo marmoratus* and *Charonia tritonis*, there is no law on paper that anyone knows of that states that shell collecting isn't legally allowed. We were told that the various provinces can make up their own laws, but, unfortunately, no one seems to know whether there are any such laws. Nothing was shown Glenn, in writing, to show that we had done anything illegal. We were in Gizo for over a week and it was known that we were shelling - you can't keep that quiet when you are using local transportation and manpower. No one, at any time, cautioned us or told us we were doing anything unlawful and the hotel knew that shelling was the reason we came to the Solomons in the first place. It's all very confusing and likely to become even more so in the future. It makes one feel that shelling is going to become a thing of the past. So, anyway ... the mix up in this case was in the interpretation of Provincial Law; if, indeed, there actually was a mix up.

Up until the last part of the last day, we really had had a grand time. As you will see from the following list, "it was rich, really rich!".

CYPRAEIDAE: arabica, asellus, carneola, caurica, coxeni, cribraria, erosa, erones, interrupta, isabella, labrolineata, lutea, lynx, minoridens, punctata, teres, tigris, vitellus

MITRIDAE: (including Costellariidae) acuminata, cardinalis, casta, chrysais, coffea, convouta, conularis, coronatum, crocatum, cucumerina, dactylus, decurta, deshayesii, ermitarum, exasperatum, ferruginea, filaris, fraga, granosum, granatina, gruneri, interlirata, intertaeniatum, litterata, lyratum, michaui, militaris, mitra, modestum, olivaeformis, pacificum, papilio, paupercula, punctata, rugosum, sanguisugum, semicostatum, semifasciatum, stictica, tabanula, verrucosa

CONIDAE: arenatus, aulicus, canonicus, capitaneus, catus, consors, coronatus, distans, ebraeus, eburneus, emaciatus, episcopatus, figulinus, flavidus, glans, imperialis, leopardus, litteratus, lividus, nigropunctatus, marmoreus, miles, miliaris, mustelinus, ornaria, pulicarius, quercinus, ranunculus, rattus, sanguinolentus, scabriusculus, sponsalis, stercysmuscarum, striatus, terebra, tessulatus, textile, trailii, varius, vexilum, virgo, vitulinus

OLIVIDAE: annulata, carneola, miniacea, parkinsoni, tessellata

MURICIDAE: Aspella producta, Chicoreus akritos, C. brunneus, C. rubiginosus, Favartia brevicula, Haustellum haustellum, Pterynotus tripterus, Vitularia miliaris, Drupa morum, D. rubusidaeus, D. ricinus, D. speciosa, Drupina grossularia, Drupella rugosa, Morula spinosa, Thais armingera, T. tuberosa, Nassa serta, Maculotriton sculptile, Phyllocoma convoluta

TEREBRIDAE: affinis, areolata, argus, babylonia, cerithina, chlorata, columellaris, crenulata, dimidata, felina, funiculata, guttata, jenningsi, larvigata, maculata, quoygaimardi, parkinsoni, punctatostriata, solida, stramina, strigilata, triserata, undulata, Duplicaria baileyi, D. crakei, Terenolla pygmaea

NASSARIIDAE: albescens, acuticostus, concinnus, coronatus, distortus, echinatus, fraudator, graniferus, globosus, sp.

NATICIDAE: Polinices mammila, P. maura, P. melanostomus, P. peselephanti, P. tumidus, Natica onca, N. suffusa, N. robillardi

TURRIDAE: Lophiotoma abbreviata, L. acuta, Turris babylonia, T. crispa, Turridrupa bijubata, T. cerithina, Clavus exasperatus, C. unizonalis, Eucithara alacris, E. cinnamonea, E. funiculata, Lienaridia rubida, Kermia cf pumila, + several unidentified species

Others: Halioti ovina, H. planata, Haliotis sp., Emarginula cf. montrouzier, Inquisitor solomonensis, Philippia radiata, Heliacus dorsuosus, Phasianella solida, Hybochelus sp., Ethminolia steamsii, Trochus niloticus f. noduliferus, Turbo chrysostomus, Chrysostoma paradoxum, Clanculus atropurpureus, Thalotia attenuata, Stomatella sp., S. cancellatus, Pseudostomatella declorata, Cerithium rostratum, C. salebrosum, C. zonatum, C. sp., Rhinoclavis asper, R. brettinghami, Clypeomorum batillariaeformis, R. fasciata, R. vertagus, Vanikoro cancellata, V. helicoidea, V. sp., Strombus dentatus, S. erythrinus, S. gibberulus gibbosus, S. labiatus, S. lentiginosus, S. luhuanus, S. mutabilis, Lambis lambis, L. millepeda, L. scorpius, Terebellum terebellum, Cymatium acquatile, C. mundum, C. nicobaricum, C. pileare, Bursa ganularis, B. rosa, B. rhodostoma, B. tuberosissima, Tutufa rubeta, Gyrineum gyrineum, Phos textum, Peristernia nasatula, P. ustulata, Planaxis sulcatus, Engina alveolata, E. lineata, E. mendicaria, E. resta, E. zonalis, Pisania truncata, Cantharus erythrostoma, C. fumosus, C. paradoxum, C. undosus, Coralliophila neritoidea, Casmaria ponderosa, Malea pomum, Colubraria muricata, C. nitidula, Volvarina sp., Iredalea pygmaea, Otopleura cf glans, O. auriscati, O. nodicincta, Bulla ampulla, Atys cylindricus, Pupa affinis, P. sulcata, Hydatina physis, Latirus belcheri, L. craticulata, L. turritus, L. sp., Mastonia rubra, M. sp., Columbella spirata, Pyrene flava, P. ocellata, P. testudinaria, P. turturina, P. sp., Mitrella ligula, Cirsotrema varicosum, H. armouretta, H. major, Dentalium elephantinum, Callidentalium crocinum, Siphonaria atra.

Bivalves: Anadara maculosa, Barbatia foliata, B. amygdalumtostum, Crassostrea gigas, Tellina scobinata, T. rastellum, T. exculta, T. staurella, T. gargadia, T. albinella, T. piratic, Antigona puerpera, A. reticulata, A. chemnitzii, Gafrarium pectinatum, G. equivocum, C. tumidum, Lioconcha castrensis, L. ornata, Acrosterigma vlamingi, A. flava, Fimbria fimbriata, Spondylus squamaosus, Comptopallium radula, Chlamys squamata, Pecten lentiginosa, Beguina semiorbiculata, Gari pennata, Codakia interrupta, Tucetona pectunculus, Timoclea maric, Ctenoides ales, Placuna ephippium, Fragum fragum, Limaria fragilis, Balissa violacea, Polymesoda bengalensis, Exotica obliquaria, Lima lima vulgaris.

Land snails: Ceratopoma fischeriana, C. spinifera, Leptopoma perlucidum, Pupina keradreni, Setaepoma hoodi, Omphalotropis cf nebulosa, Melanoides sp., Partula flexuosa, Placostylus strangei, Lamellaxis gracilis, Subulina octona, Succinea simplex, Dendrotrochus cineraceus cleryi, D. cyrena, D. meridionalis, Helicarion malaitaensis, Trochomorpha xiphias, T. zenobia, Chloritis sp., C. eustoma, Megalacron lombei, Papuina sp. [2], P. gelata maddocksi, P. lienardiana, P. vexillaris, Smeatonia eddystonensis, Solmolella frigilla, Solmodado flexilabris, Bradybaena similaris, Neritina sp [3] ... and apologies for the many mistakes I'm sure you all will find.

AARON HONORED

Many of you have read articles in our magazine by Aaron Baldwin and have read of him is articles about our museum's trips to Costa Rica and Mexico. He's now about to graduate from the University of Alaska in Juneau, is married and works in computers and as a consultant for NOAA amongst others.

Anyway, in the early 1990's, on the way back from Costa Rica, Aaron and I stopped in Mexico to do a bit of collecting. Aaron was specializing in crustaceans then and spent hours searching out and collecting crabs and, especially, burrowing shrimp. On our return to the U.S. specimens of the latter were sent to an expert at the Smithsonian for identification. We learned that one extended the range of an Indo-Pacific species to the west coast of Central America for the first time. Neat.

Just last month, Aaron was honored when Dr. Williams, in a paper in the Proceedings of the Biological Society of Washington, honored him by naming *Upogebia baldwini*. This is a burrowing mud shrimp that Aaron collected near Caimanero, Sinaloa, México amongst mangroves.

Suppose you can tell, I'm very happy for Aaron and proud of him as well.

TOM RICE

BEACH FOUND COWRIES IN INDIA

W. Krommenhoek

The author at Aliyar Sea Shell Importium, Ramasawarm, south India, studying beach-found cowries.

Dr. Letteplein 1; 3731 JR De Bilt, Holland

In August of 1997 I visited India and had the opportunity to explore the Adam's Bridge area - the natural geographic connection between India and Sri Lanka. During my stay in Rameswaram, the last Indian city on the isthmus at the beginning of Adam's Bridge, I noticed the absence of fresh washed-up shells on either beach north or south. This surprised me at first, but soon I discovered a very strange phenomenon. Rameswaram is a famous Hindu pilgrimage city and thousands of pilgrims come here every day from all over India. In the morning they take a bath in the sea and with drippibng clothes they visit the temple, which is a couple hundred meters from the seashore. For many of them it is their first sight of the ocean and, as a souvenir, they take a shell or something made of shells. Consequently, there is a very intensive shell industry, involving many families, making a wide range of shell products. Women and children, especially, are involved in collecting the shells. They also sell them in large bags to the many shell industries in town. The result of this never ending activity is that hardly any shells, including cowries, can be found on the beaches of the Adam's Bridge isthmus. On the other hand, in the temple and adjacent streets there is a wide range of shell products for sale, ranging from tiger cowries engraved with the image of gods and goddesses, necklaces, picture frames, ornaments to decorate electric bulbs, etc.

By this time I had given up the idea of producing a species list for cowries in this region. Then, by accident, I came across Aliyar Sea Shell AEmporium and met Mr. Jahabardeen from the India Shell Crafts. It was thanks to him that I could make the following list. These were specimens found on the beaches and sold to him. Large containers filled with cowries were shown to me, and this merchant evidenced a remarkable knowledge of the Latin cowry names. With his help I made this list of cowries found washed up on beaches on the isthmus at the beginning of Adam's Bridge and collected by women and children from the fishing villages in that region.

Cypraea annulus
C. arabica
C. argus
C. asellus

C. caputserpentis
C. carneola
C. caurica
C. chinensis
C. clandestina
C. erosa
C. errones
C. felina
C. gracilis
C. helvola
C. histrio
C. interrupta
C. isabella
C. lynx
C. mappa
C. mauritiana
C. moneta
C. nucleus
C. ocellata
C. onyx
C. poraria
C. scurra
C. talpa
C. teres
C. tigris
C. vitrllus

Map indicating the position of Adam's Bridge in the southeast corner of India.

Although it was not possible to make any ecograms, some remarks can be made when this list is compared with the one I produced for washed up species of cowries in south Sri Lanka last year.

Remarkable are the large numbers of *C. histrio* specimens found in India, where I did not find the species in Sri Lanka. Present in India in small numbers, and not found at all in Sri Lanka, was *C. asellus*. Other species found here and not in Sri Lanka, were *C. mapa. C. onyx, C. scurra* and *C. teres*. However, these are not at all common species and I have probably just missed them in Sri Lanka. Most surprising is the rare presence or absence in India of species like *C. felina, C. hirundo,. C. interrupta* and *C. kieneri*, which are among the five most frequent species in Sri Lanka.

This brings me to the presumption that the Adam's Bridge area on the east side of southern India is in the calm of the monsoon drift which passes south of India and Sri Lanka both in winter and summer, thus preventing equal distribution of species in areas that are only about 350 km apart. I will go into more detail about this matter on another occasion.

REFERENCE

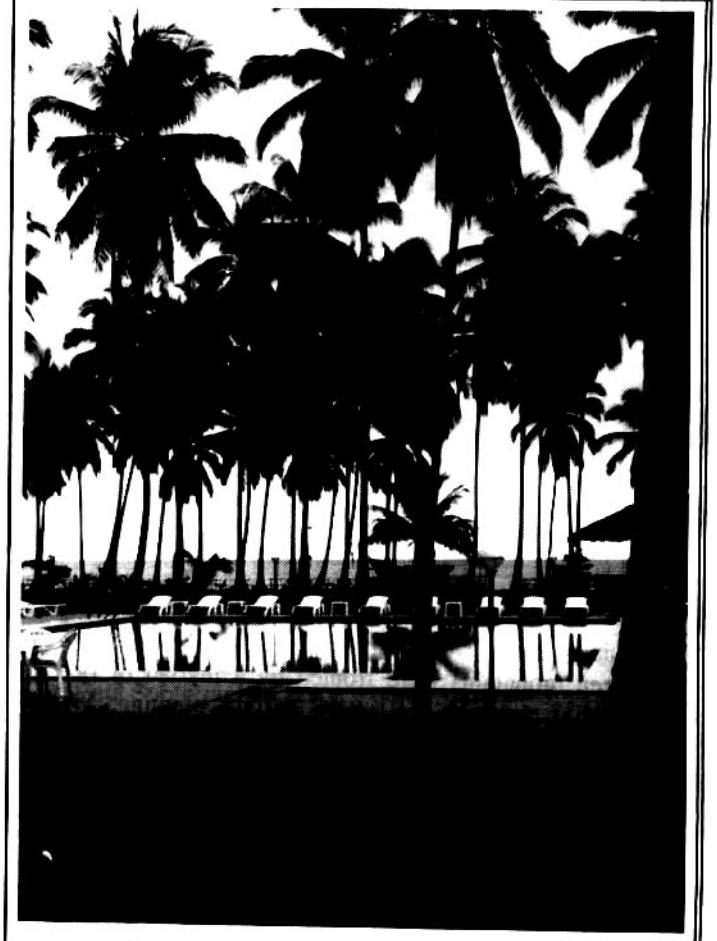
Krommenhoek, W. 1996. Beach-found Cowries in Sri Lanka II. Of Sea and Shore, 19:3:159-60

DESTINATION PARADISE

Tom Rice

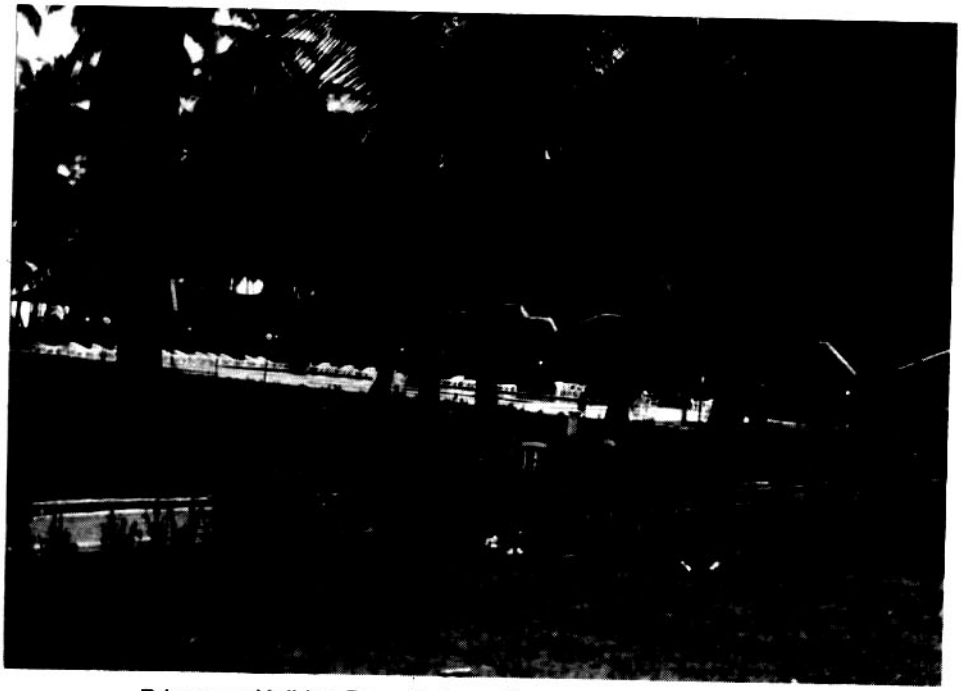
Palawan is the furthest west of all the islands of the Philippines and is still the most undisturbed. High peaks, clinging jungle, endemic plants and animals, especialy butterflies, make this province a destination of note for naturalists the world over. I, along with Drew Skinner, had made a quick trip here a few years back - sort of a "spur of the moment" thing, we were in Manila and wanted to explore further afield than the usual Cebu area (besides, we'd already been there that trip!). We stayed in Puerto Princssa in central Palawan - capitol and largest city in the province - and rented a car to explore a bit of the island to either north and south of the city. To the north we rented a boat and boatman to visit some of the small islands in Honda Bay - Cowry, Starfish, et. To the south we collected on a small cobble beach just beyond the penal colony.

This year (1997) I had made arrangements to stay five days at a new resort 1½ hours south of Puerto Princessa, near the village of Arborlan. Princessa Holiday Resort is owned by Tess and Roger Van der Berghe (Roger's a longtime shell collector who I corresponded with while he lived in Singapore). A friend from Manila, Frederick, accompanied me and following our ninety minute flight from Manila, we were met at the Palawan airport by Grace from the resort's staff.



The Sulu Sea lies beyong the swimming pool.

The road south had not improved much, still paved stretches with occasional potholes or areas washed away by recent storms (it was, after all, just after the rainy season). But the passing scene took one's mind



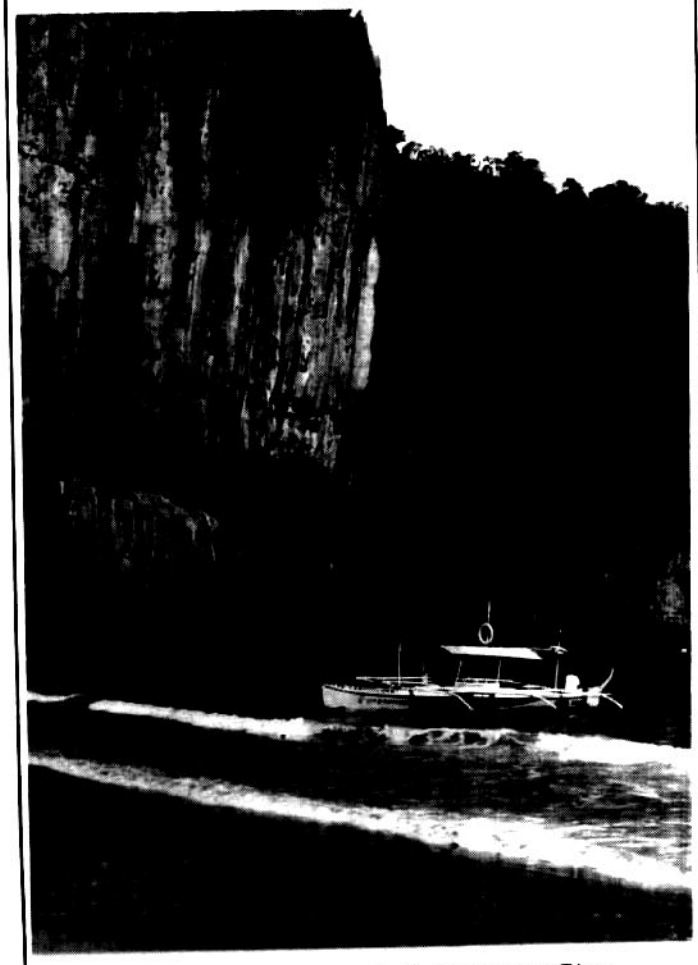
Princessa Holiday Resort's bungalows nestle under the palms.

The reef near Princessa Holiday Resort.

quickly away from the bumps and jolts. Distant lush green mountains were fronted by a myriad of rice paddies, farmers and water buffalo plowing. We passed by a one-of-a-kind coconut palm which had grown in a cork-screw shape! We zipped through small villages, recently washed by the morning's rain. The hour-and-a-half trip flew by and we leaft the main road for the short drive, just beyond Arborlan, to the Princessa Holiday Resort. Greeted at registration with a cool refreshing drink of *buko* juice, we soon were settled in our room.

Princessa Holiday Resort is brand new. It's situated on a crescent of beach on the eastern shore of Palawan and the Sulu Sea. Each of the resort's units consist of two accomodations. Our standard room included two large beds, dressing table, wardrobe, ceiling fan and a small private bath. The covered porch had two comfortable chairs and a small table. All were constructed of native woods and polished to a high sheen. Very comfortable. Other units are equipped with air conditioning, but I prefer fan-circulated air for cooling. The resort grounds abound with native flowering plants and trees and the area is meticulously maintained. A large (¼-Olympic size) pool had been completed shortly before our arrival and Frederick spent many happy hours there. The open-air dining room produced many a delicious meal during our stay. The menu includes native dishes, as well as American and European temptations. The kitchen even cooked my larger shells for me! (Presenting them to me in a covered chafing dish!)

The beach in front of the resort slopes somewhat steeply into the Sulu Sea, but in either direction were sand flats and to the south about a kilometer away was a point with a coral reef, mangroves and other beckoning habitats. The low tide occurred in the hours just after dawn. The first morning, while it was still dark I was awakened by a rapidly moving thunderstorm. Soon a downpour commenced and I had thoughts of missing the tide, however, in short order the storm had passed and the sun rose and I treked out to follow the receding waters. Soon I was following the trails of two small species of *Hastula*, picking up colorful examples. Approaching the reef,



Our boat nears entrance to Subterranean River.

Monitor lizard check out visitors to St. Paul Subterranean River.

I noticed a number of local people searching for something - found out they were after octopus and *Turbo argyrostomus*, I too collected some of the latter. On several visits to this reef area I managed to collect several dozen species ranging from *Lambis*, *Oliva*, *Latirus*, *Pyrene*, *Cantharus*, *Cypraea*, *Conus*, *Cymatium*, *Nassarius*, *Columbella* and many other families and genera. After several hours on the reef and the walk back, as the sun heated the tropical air, it was especialy nice to sit in the dining area for a breakfast of pancakes or eggs with longanisa or tocino.

One day after breakfast Frederick and I decided to go exploring and walked back towards Arborlan, catching a tricycle a few hundred meters up the road. After visiting the small market in Arborlan we hired a tricycle for the trip to the larger town of Nora. Here the larger market provided us with some items we'd forgotten to pack and also gifts for friends back in Manila. As we left town, heading back to the resort, I asked our driver if we could go to the Estrella Falls at the foot of the local mountain range. I had hoped to find some freshwater nerites or other mollusks, but had no luck, although we did enjoy the falls and the picnic area where local families were enjoying the beautiful day and a dip in the pool at the base of the falls.

After several mornings of being awakened by thunder storms, the third morning they were absent, no natural alarm clock. I was, however, still up at dawn and after studying the horizon noted that it looked as if it would be a clear morning. I headed to the point once again and searched the upper beach area amongst the mangroves and other trees growing there. I discovered two species of Melampidae, several of Cerithiidae and Littorinidae. I was engrossed in my collecting and didn't notice the dark clouds quickly approaching until I was suddenly brought upright from my "shell collector's stoop" by a clap of thunder almost directly overhead, quickly followed by a downpouring of immense rain drops. I took shelter under a large tree until I remembered that that is the worst place to be during a lightning storm. Soon I was slogging back across the sand flats (my camera clutched inside a large ziplock back brought along for the purpose). I was soaked after only a few meters, but the rain was warm (especially when compared to December rains in the Pacific Northwest) and I didn't mind the walk. I noticed that no one else was on the beach, with the exception of a group of young children cavorting in the surf just beyond the resort.

Afternoons were spent quietly reading, cleaning shells or taking a nap. This time of day can get really hot and natives of the tropics have the right idea when they set aside this part of the day for a "siesta". I find it usually is best to adopt these native customs.

A visit to Palawan would not be complete without a trip to the St. Paul Subterranean River National Park. The ride to the park is part of the "fun". We had our own car, driver and guide - you can make arrangements through the resort's front desk for this and other excursions - and started at 6 a.m., stopped

continued on page 54

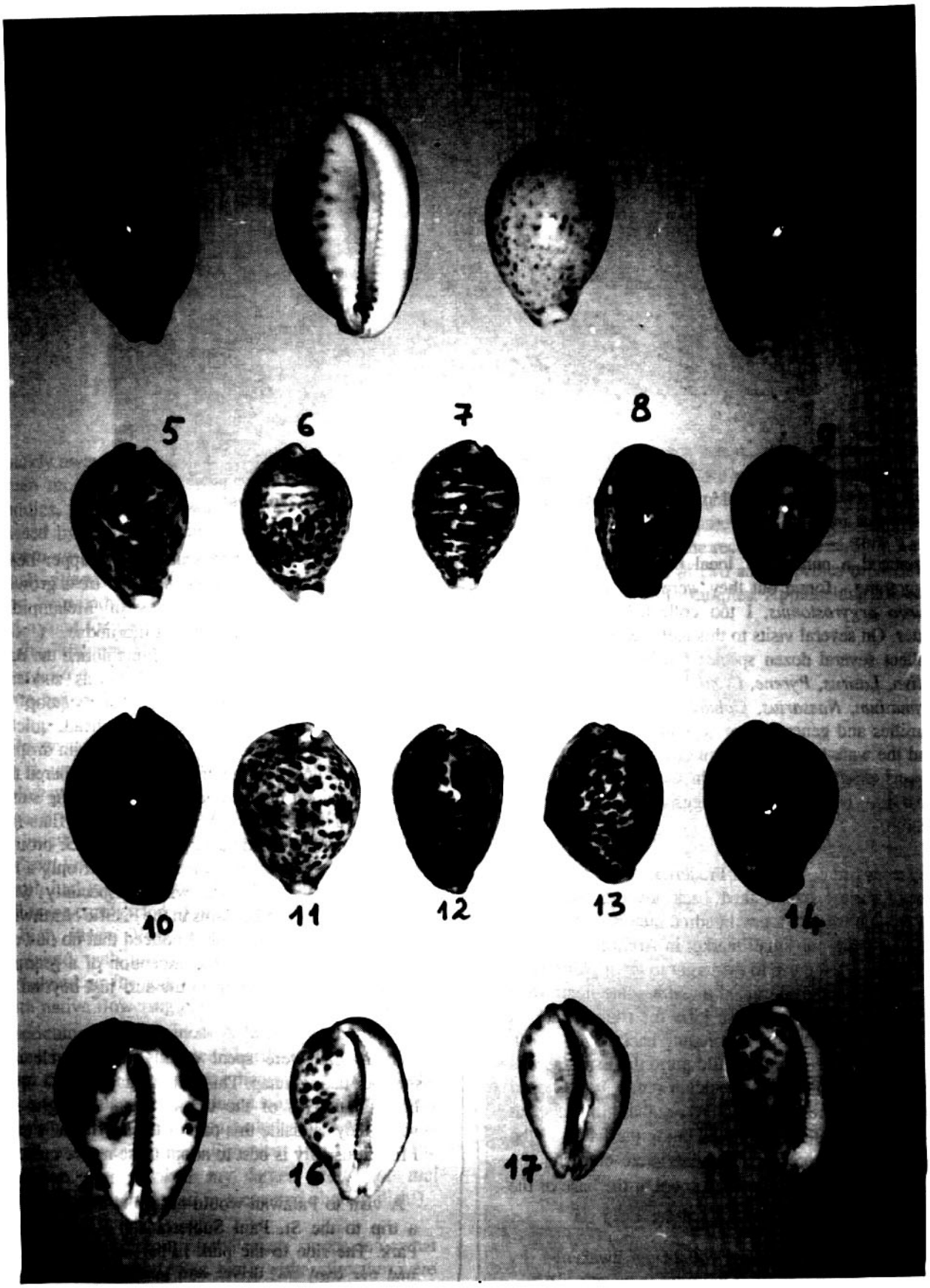


Plate 1

See story starting on the next page.

PRELIMINARY OBSERVATIONS on the VIETNAMESE SHELLS

DR. N. N. Thach

Situated in Southeast Asia, Viet Nam is a tropical country. Since it is situated at the meeting area of the Pacific and Indian Oceans, seashells are rather abundant. More than 2,200 species have been listed. We can collect many kinds of mollusks in Vietnamese waters, from the rare species (*Cypraea guttata*, *Lyria kurodai*) to the uncommon species (*Amaea magnifica*, *Latiaxis mawae*), from the giant *Tridacna gigas* to the tiny *Umbonium vestiarum*, from the gastropods (*Charonia tritonis*, *Hemifusus colosseus*) to the bivalves (*Malleus albus*, *Tellina foliacea*). The mother-of-pearl bearing shells such as *Turbo marmoratus*, *Pinctada maxima*, *Trochus niloticus*, *Pteria penguin* which every year provide thousands of tons of raw material for the lacquer-ware handicraft industry. After twenty-three years of collecting, and selling, seashells, I would like to, in this article, comment on a number of special and freak shells from Viet Nam.

CYPRAEIDAE. Cowries are the commonest shells of Viet Bam. Starting with *Cypraea tigris* (the largest measuring 120 mm, while the dwarf specimens measure only 59 mm). On Plate 1 we see a red specimen (No. 2) with the characteristic color of a shipwreck region; No. 3 is an albino. A melanistic specimen is shown in figure 1. On the dorsum of specimen No. 4 there are transversal bands on a brown background (instead of the usual round spots). The dorsal line of No. 5 is branched, while the posterior dorsum of No. 6 is lacking the black dots. Number 7 is decorated with parallel lines across the back. The dorsal line in No. 8 is rather broan (10 mm), while, especially on the dorsum, No. 9 has a longitudinal band of light color (reminiscent of juvenile specimens, although the shell is definitely adult).

Plate 1, Numbers 10 to 18 are distorted specimens. No. 10 has the anterior extremity considerably thickened and elevated. No. 11 is posteriorly hunchbacked. The dorsum of No. 12 is flat leftwards, looking as if someone had steppen on it. No. 13 is laterally distorted (directed outward). Half of the shell shown as No. 14 is elevated while the other half remains "normal". Cowries No. 15 and 18 are damaged, respectively, backward and at the middle of the body. The terminal ridge of No. 16 is deformed, while some labral teeth disappear on the 17th specimen.

In regards to *Cypraea mappa*, we can recognize at once on Plate 2, the red color of a specimen living in shipwreck waters (No. 20). The dorsal lines of other *C. mappa* are either branched (No. 22) or doubled (No. 21) or larger and not clear (No. 19).

Our largest cowrie, *Cypraea testudinaria* (146 mm) is illustrated as No. 23. *Cypraea mauritania* (No. 25) is niger, while two other specimens (Nos. 24 and 26) of this species have, respectively, relatively large and small dots on the dorsum.

The uncommon *Cypraea argus* is frequently found off southwestern Vert Nam (Phu Quoc Island) with big rings (No. 27), or rings almost connected together (No. 29). The color of the *C. argus* shown as No. 30 is dark grey, while there are no rings on the posterior half of No. 28. No. 31 is a dwarf *C. argus* (55 mm). Generally speaking, the *Cypraea argus* from off southwestern Viet Nam are much smaller than those from off central Viet Nam.

Cypraea arabica (our No. 32) has its base and dorsum extremely enlarged (width measuring 47 mm). A normal *C. arabica* of equal length is only 40 mm wide! Besides, ther base and labrum are completely beige (no brown spots as in other *C. arabica*).

No. 33 is a rare species, seldom found in Viet Nam. This *Cypraea guttata* is 68 mm in length. The special cowries of small size, such as *Cypraea errones*, *C. miliaris*, and *C. chinensis* will be covered in another article.

CONIDAE. On the upper portion of Plate 3, we see three cones: *C. betulinus* (No. 35), *C. litteratus* (No. 38) and *C. marmoreus* (No. 34) with elongated spires. No. 36 is an albino. The yellow *C. betulinus* (No. 37) has a body whorl which is constricted in the middle, as if it had been tied by a wire during its growth.

MURICIDAE. The muricid, *Haustellum haustellum* shown (No. 40) is an albino, while Nos. 41 and 42 have siphonal canals curved, respectively, backward and leftward. In No. 39 the siphonal canal was broken and replaced by new one, much shorter and recurved backward.

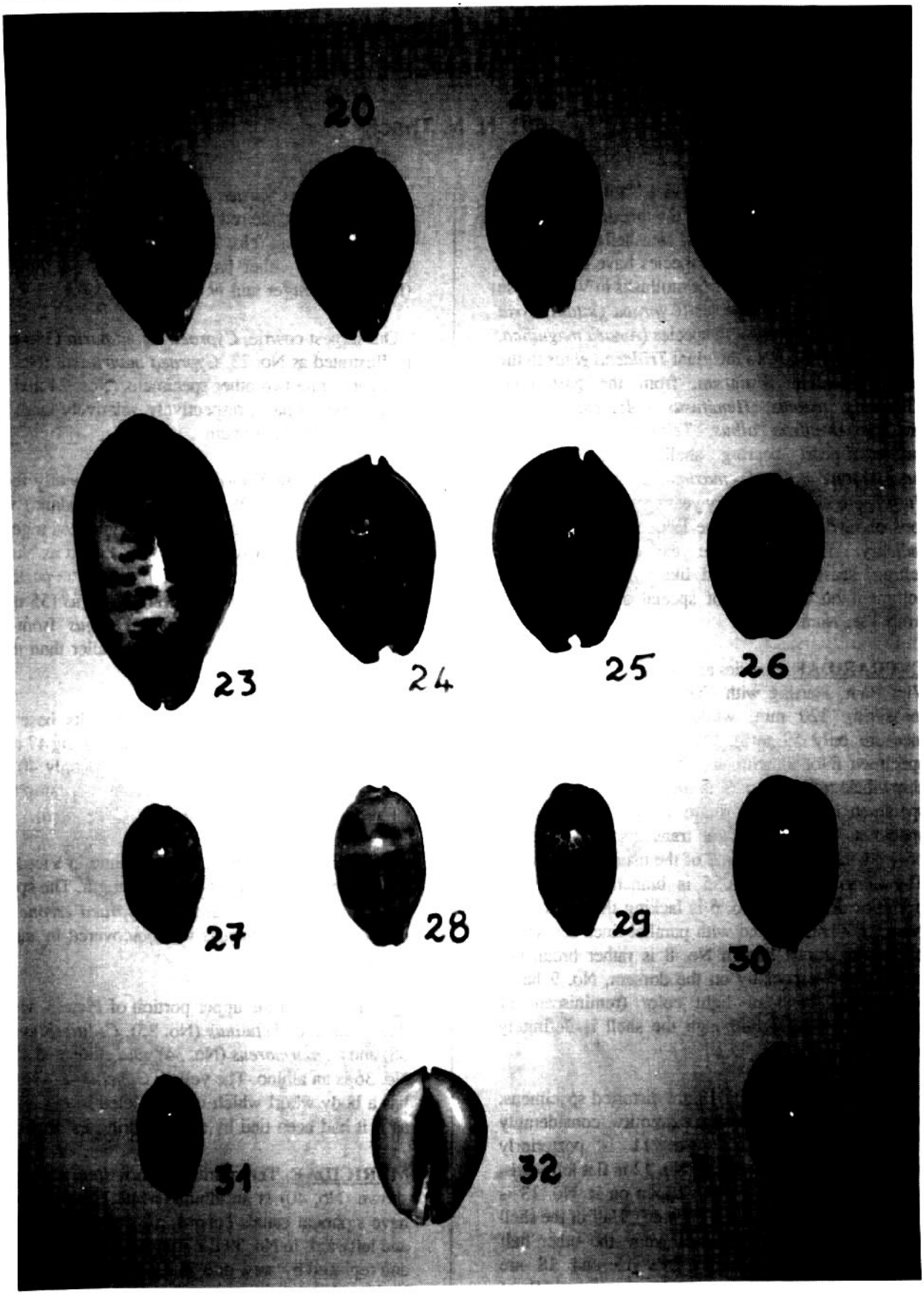


Plate 2

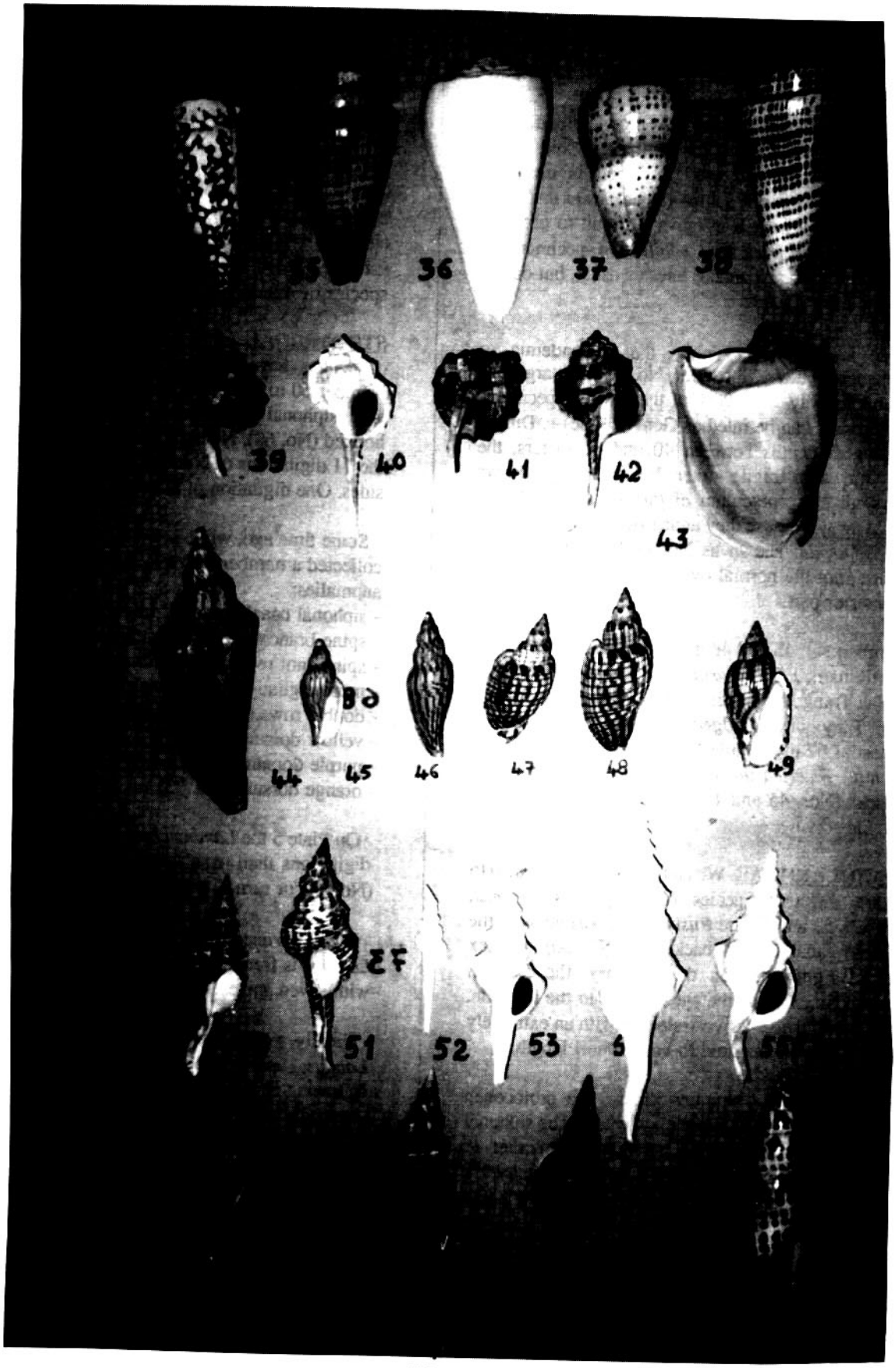


Plate 3

VOLUTIDAE. *Cymbiola nobilis* is an uncommon species found abundantly from Nha Trang, Pham Thiet, Long Hai to Phu Quoc Island (Gulf of Siam). Most specimens are collected by trawlers and, thus, have broken outer lips. This mollusk is sold at the markets for food and then the shell is used for manufacturing bedside lamps (as are *Melo melo* and *Chicoreus ramosus*). It is rather difficult to obtain a Gem quality specimen of *C. nobilis*. On specimen No. 43 there are no axial zigzag lines as usual, but only a beige color!

Lyria kurodai is a volute that is endemic to Vietnamese waters. Specimen No. 48 is a large one (105 mm). Only 10 to 20% of the trawled specimens of *L. kurodai* can be rated as Gem or Fine++. During dredging at depths between 40 and 50 meters, the very thin and fragile outer lip is nearly always destroyed. The operculum of this species is always thrown away because they attach firmly to the mantle. The *L. kurodai* shown as No. 49 has a rectangular aperture, not the normal oval one. No. 47 is freak at the anterior part.

Numbers 44, 45 and 46 are specimens of the volute recently named *Fulgoraria ericarum* and come from off Nha Trang, the center of the shell business in Viet Nam. They were dredged in 1997. No. 45 is the shortest at 67 mm, while No. 44 is the record size at 203 mm. *F. ericarum* exists in two forms: smooth shoulder (Nos. 45 and 46) or knobbed shoulder (No. 44).

FASCIOLARIIDAE. We can see that Numbers 50 to 55 are different species of the genus *Fusinus*. Numbers 50 and 51 are *Fusinus nicobaricus* with the siphonal canal curved backward (No. 50) or apex directed rightward. On the contrary, the *Fusinus forceps* (No. 52) has the apex turned to the left side. *Fusinus* Number 54 is very slender with an extremely elongate spire, compared to body whorl length.

Fusinus undatus, Number 53, has the protoconch turning perpendicular to the body whorl. The siphonal canal of No. 55 is not as straight as in other *F. undatus*, but strongly curved forward. The *Fasciolaria sp.* (No. 56) has a smooth shoulder and a siphonal canal which is curved to the right side, while the *Pleuroploca filamentosa* has the anterior extremity bifurcated.

RANELLIDAE. The uncommon Pacific Triton, *Charonia tritonis*, can be found off Viet Nam. In the past thousands of tritons have been exported to URSS. There were many tritons which measured as long as 400 mm! The Russians much appreciated this species. No. 58 is the smallest adult specimen at 118 mm. These mollusks like rocky bottoms, therefore it is very difficult to collect a giant triton of gem quality with the protoconch intact!

MITRIDAE. *Mitra mitra* (No. 59), collected off Phu Quoc Island is the longest miter (at 145 mm) found in Viet Nam. Among other species of miter, we can cite: *M. interlirata*, *Vexillum acupictum*, *Cancilla isabella*, *Scabricola desentangii* ... more than 30 species of miters have been listed.

STROMBIDAE. Every year thousands and thousands of conchs have been collected. On Plate 4, from Number 60 to 64, we see a series of *Lambis scorpius* with siphonal canal branched in two (No. 60) or hooked (No. 63). Number 62 has 13 digitations while the 11 digitations of Number 64 are directed to many sides. One digitation of Number 64 turns 90 degrees.

Some time ago, while selecting *Lambis crocata*, we collected a number of freak shells with the following anomalies:
- siphonal canal branched in two (No. 68)
- spine branched once (No. 69) or twice (No. 67)
- spines not regularly distributed (No. 66)
- more digitations than usual (No. 65)
- double rows of spines (Numbers 70 and 73)
- yellow dorsum (No. 71)
- purple dorsum (No. 72)
- orange dorsum (No. 73)

On Plate 5 the *Lambis chiragra* as No. 75 has fewer digitations than usual. The spine is branched in two (No. 77) or turned perpendicularly (No. 76).

Lambis truncata, the largest species in the genus *Lambis*, is frequently in Viet Nam. No. 78 is a freak with seven spines.

Finally, we must mention the most abundant species, *Lambis lambis*. We have specimens with the following irregularities:
- outer lip highly rostrated (No. 80) or unequally wide (No. 79).
- spine hooked (No. 81), curved leftward (No. 83) or met by another spine (No. 82).

There are many more special shells, belonging to other families that I want to present. But that is for the future.

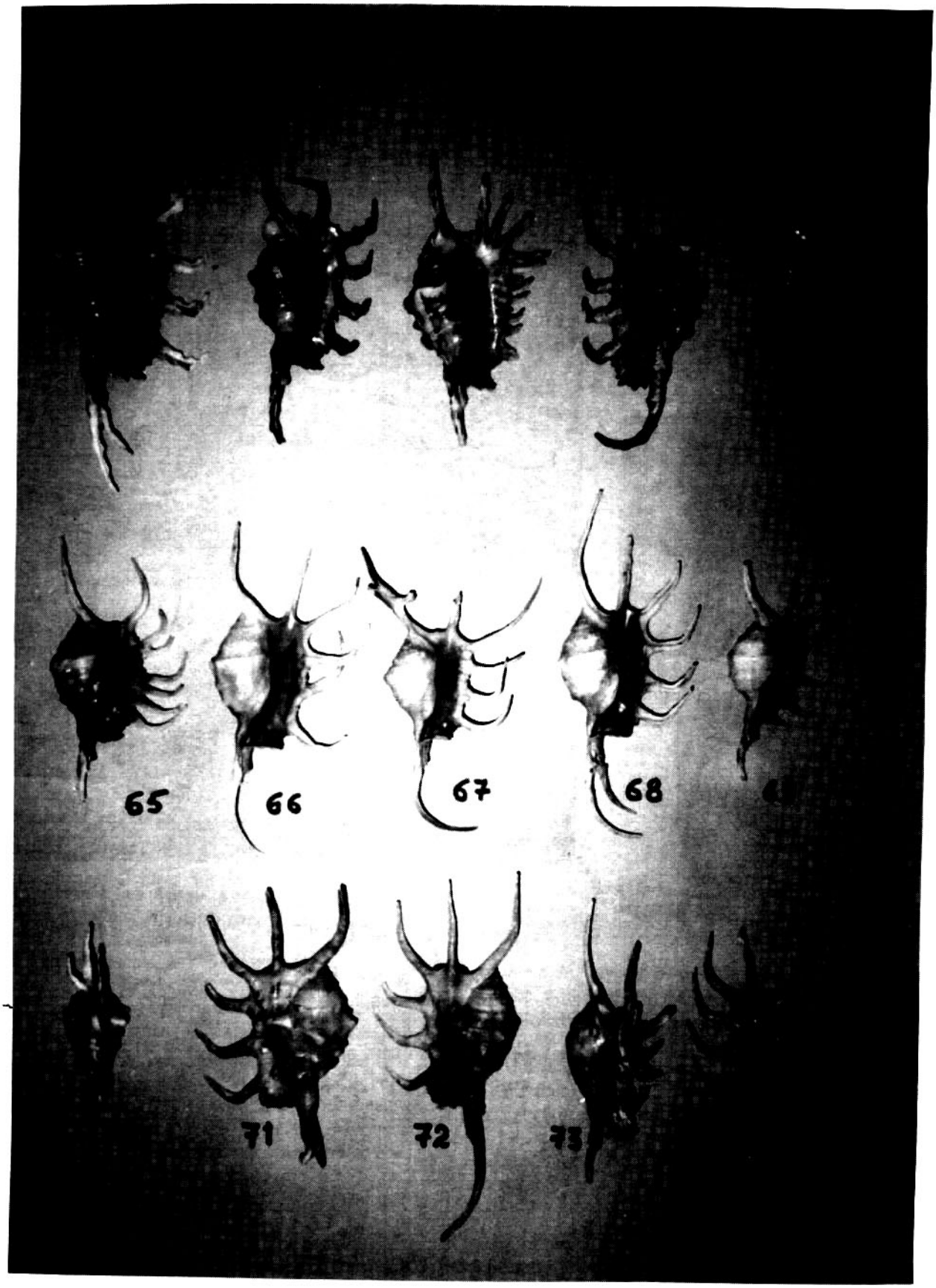


Plate 4

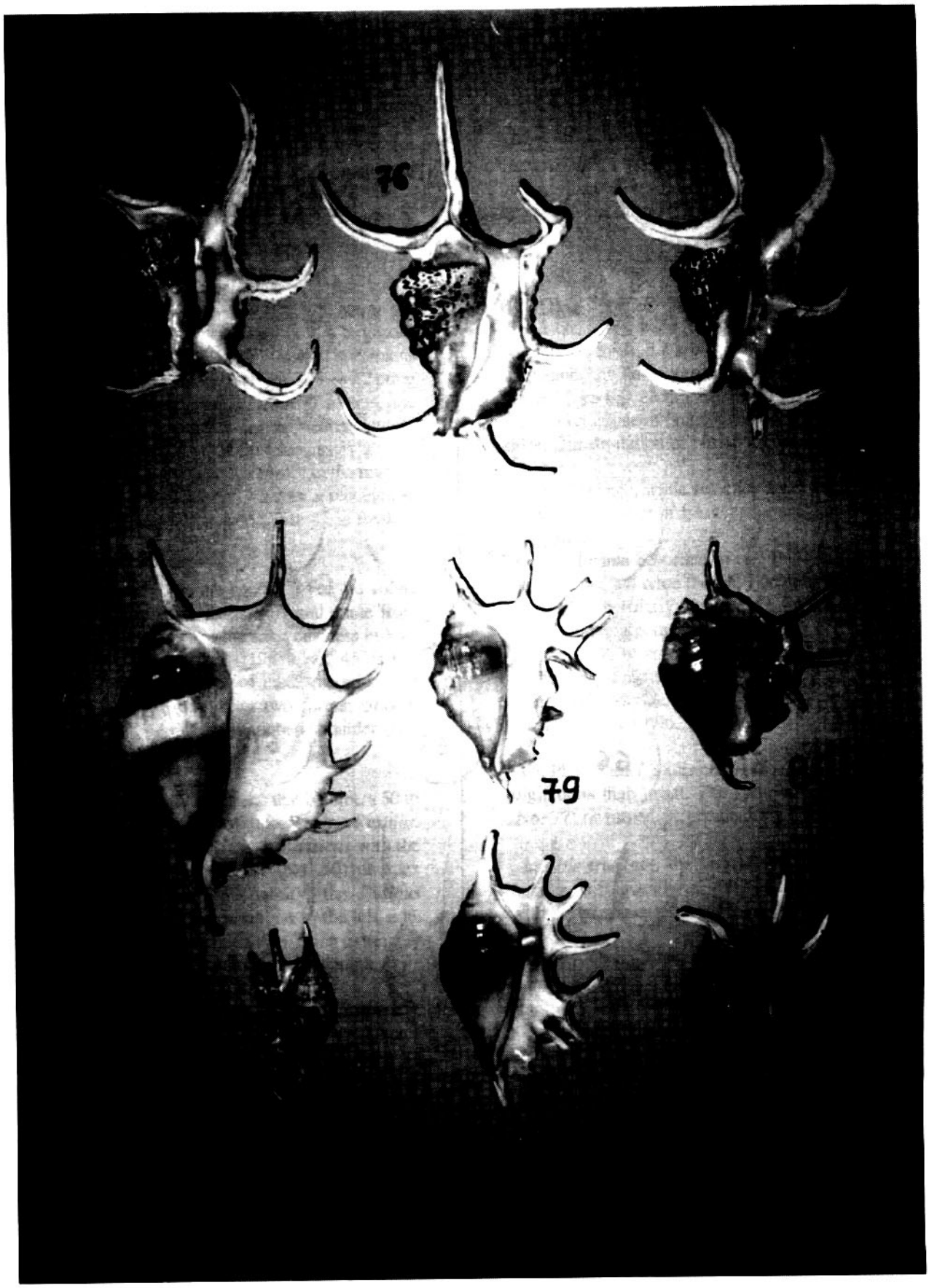
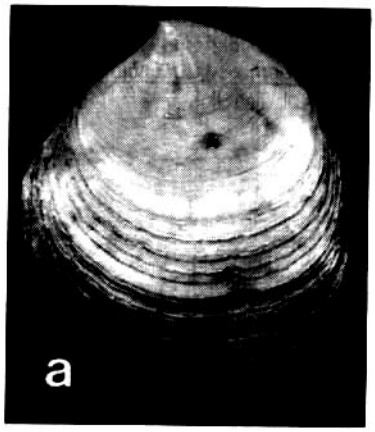
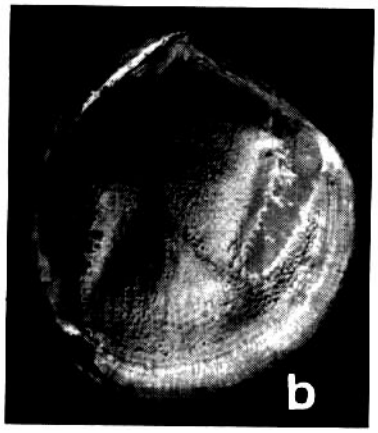


Plate 5

Recently Described Shelled Marine Mollusks

Rastafaria thiophila Taylor & Glover, 1997 (a) is holotype. Note the fascinating periostracal pipes.





Above: *Rastafaria calypso* Glover & Taylor, 1997.

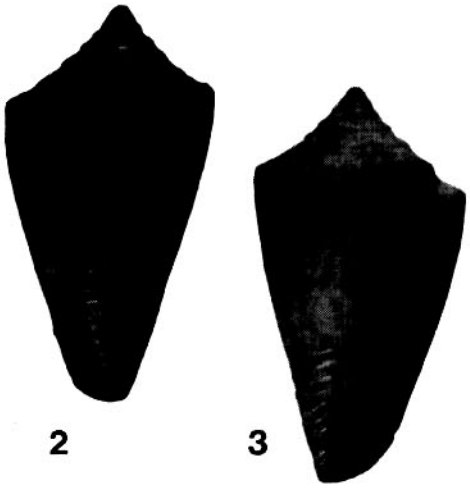
I've always enjoyed coming across a scientific name that shows the author had a sense of humor. The first time I saw the genus *Hunkydora* Fleming, 1948 (Mollusca: Bivalvia: Myochamidae) I laughed. Now, along comes another genus with a fascinating name: *Rastafaria* Taylor asnd Glover, 1997 (Mollusca: Bivalvia: Lucinidae). A second species has been added to the new genus.

***Rastafaria calypso* Glover & Taylor, 1997**
Found in the Red Sea and Madagascar
Journal of Conchology 36(1): pp. 3-7

The obvious feature of the genus concerns the periostracum, which is thick and shaggy, and extends beyond the ventral margin, in the type species (*R. thiophila* Tayloer & Glover, 1997), as up to seven ribbon-like pipes. Also the species exhibit a distinctive tear-drop shape.

The new species (the type of the genus is from Western Australia) has been found in waters off Egypt in the Red Sea, in the Gulf of Aden and at Nossi Iranja (32 miles south of Nossi Bé) in Madagascar at depths around 30 meters. The new species is larger, up to 45mm and has a more ovate outline than the genus type species. It also has a heavier shell and can have a heavily pustulate interior surface. The typical periostracal pipes of *R. thiophila* are not preserved in *R. calypso* although one specimen from Madagascar has remains of a thick periostracum with remnants of shrivelled pipes. The new species is named in honor of the late Jacques Cousteau's research vessel.

REFERENCE
Glover and Taylor. 1997. New Species and Records of *Rastafaria* and *Megaxinus* (Bivalvia: Lucinidae) from the Western Indian Ocean and Red Sea, with a Reappraisal of *Megaxinus*. Journal of Conchology (1997), Vol. 36m No. 1, 1-18.



Conus (Leptoconus) paschalli Petuch, 1998

Cone shells are amongst shell collectors' favorite species and several new ones have been named recently.

***Conus (Leptoconus) paschalli* Petuch, 1998**
Eastern coast of Nicaragua near Puerto Cabezas
The Nautilus 111(1): 36-37

The author compares the new species to *C. portobeloensis* Petuch, 1990 from the San Blas Islands area of Panama. He points out differences in shell shape (new species is smaller, stockier, proportionally shorter and has a more pyriform body whorl; the new species has a sharplyy-angled shoulder, nearly carinated, the older species being more rounded with only the faintest hint of a carina. The spire of the new species is distinctly stepped and the shell is smooth with faint longitudinal striae - *C. portobeloensis* is distinctly sculptured with fine spiral threads and striae. In color the anterior tip of the new species is pale pinkish-lavender, the older species is pale yellow-orange. The author points out other distinctive characteristics as well.

REFERENCE
Petuch, Edward J. 1998. The Molluscan Fauna of the Wawa River Region, Miskito Coast, Nicaragua: Ecology, Biogeographical Implications. The Nautilus 111(1): 22-44. Jan.

I am very pleased to see the following species named in honor of friends in Thailand. You have read about my trip to Phuket, where the new shell museum has now opened (hope to have a story next issue), owned by the Patamakanthin family, father Somnuk and son Somwang. This new species honors Somnuk's efforts in bringing attention to the shells of Thailand.

***Conus patamakanthini* Delsaerdt, 1997**
Dredged (120m) south of Racha Noi- south of Phuket
Gloria Maris 36(3), pp. 45-49

The large species (holotype just under 90mm) is described an being narrowly conoid-cylindrical with a spire of moderate height, slightly concave; shoulder angulate. The elongated last whorl is encircled with about 40 flat ribbons on which are brown, axial, short streaks. This pattern is overlaid with irregular brown blotches grouped in two broad, interrupted spiral bands and in a smaller band near the shoulder. Teleoconch sutural ramps with 3-4 spiral grooves, axially and finely striated. Pattern of spire axially veined.

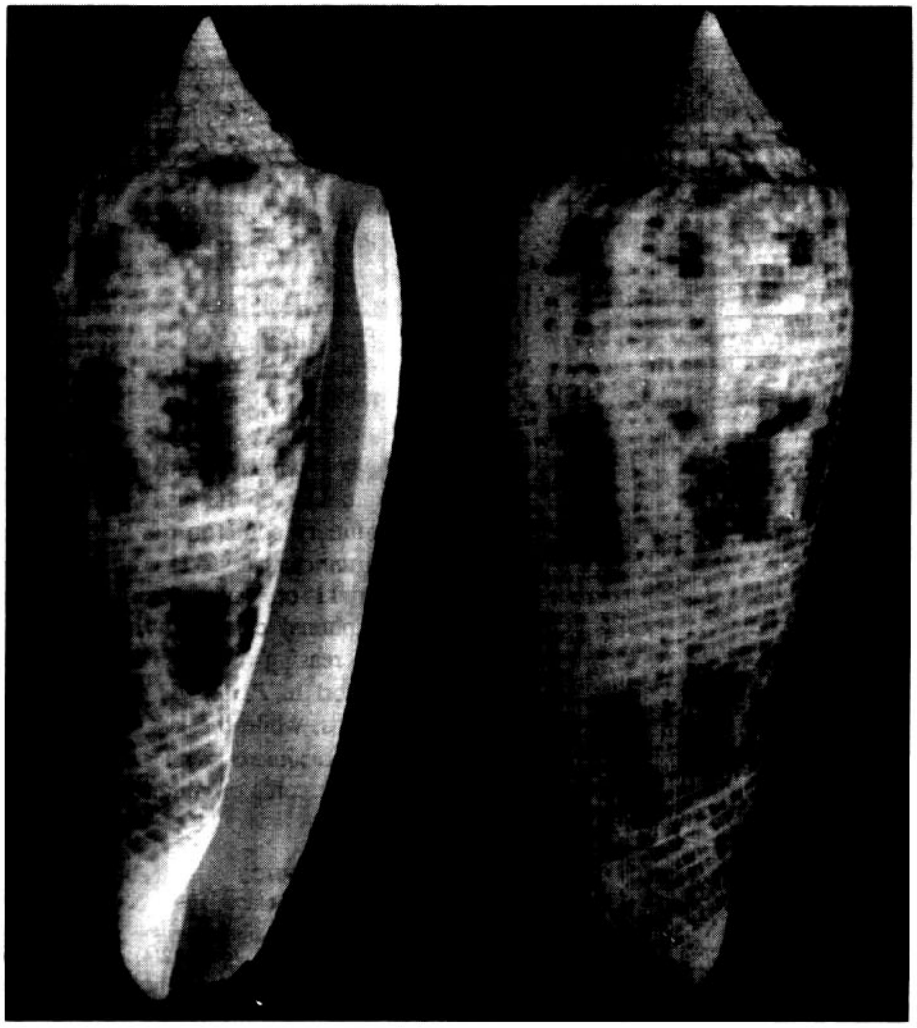
The author gives characteristics to separate the new species from *C. australis* Holten, 1802 - *C. gabryae* Korn and Röckel, 1992 - *C. armadillo* Shikama, 1971 and *C. ranonganus* da Motta, 1978.

REFERENCE
Delsaerdt, A. 1997. *Conus patamakanthini* a New Species from Thailand. Gloria Maris 36(3), 45-49, Dec. 1997.

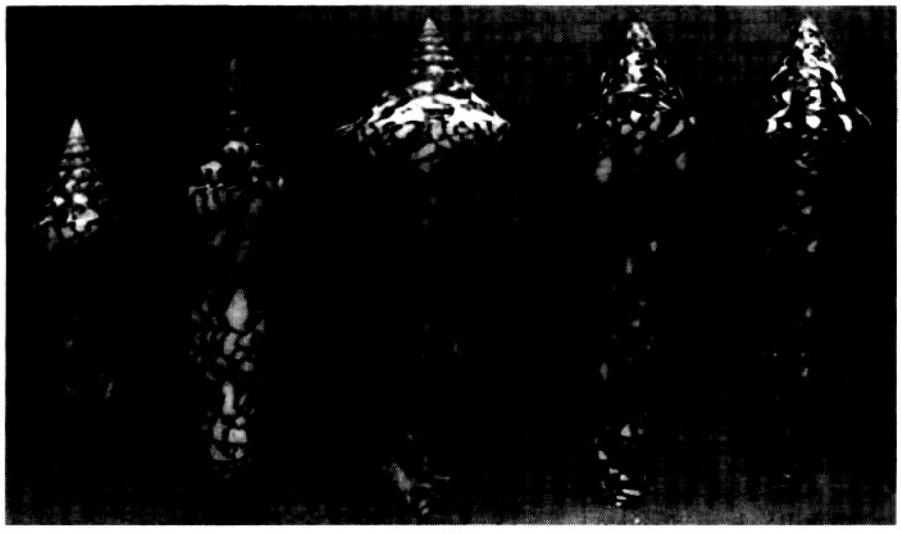
***Conus eduardi* Delsaerdt, 1997**
Red Sea and Gulf of Aden
Gloria Maris 35(4-5). May 1997

The complex of tent cones has confused collectors for many years. Now a new species has been introduced for a form which had previously been thought possibly a form of *C. kawamurai* Habe, 1961 (from Japan area) or *C. milneedwardsi* Jousseaume, 1894, and is compared with them and *C. bengalensis* Okutani, 1968 and *C. lemuriensis* Wils & Delsaerdt, 1989 (all from the Indian Ocean), but was separable from any of these, especially in the spire. (See photograph for comparisons.)

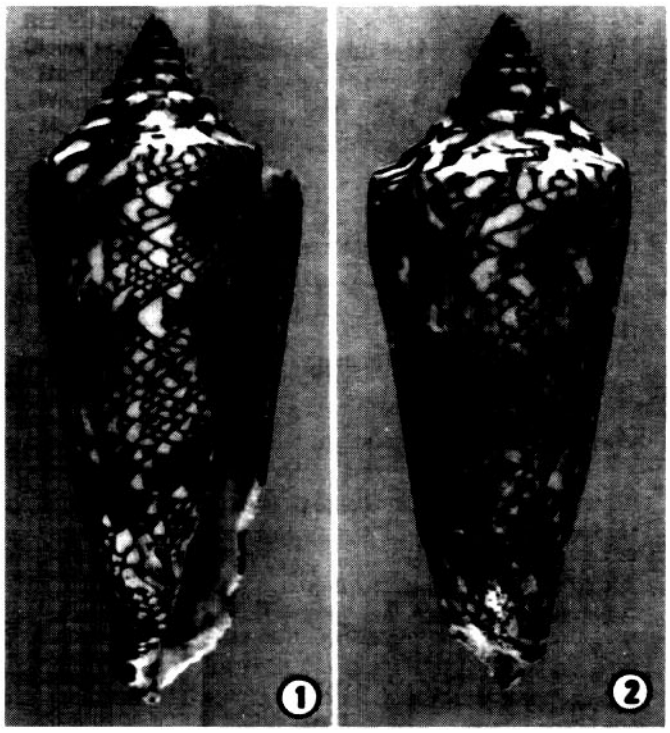
REFERENCE
Delsaerdt, A. 1997. *Conus eduardi* A New Species from the Red Sea. Gloria Maris: (35-4-5), 57-62. May 1997.



Conus patamakanthini Deldaerdt, 1997



Left to right: two specimens of *Conus milneedwardsi*, then the newly described *C. eduardi* and on the far right a pair of *Conus bengalensis*.



Holotype of *Conus eduardi* Delsaerdt, 1997

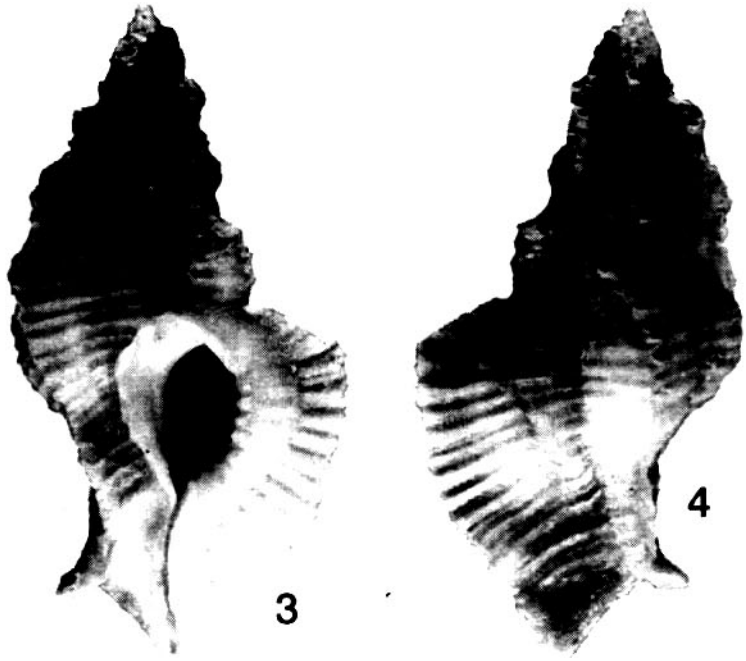
***Pterynotus laurae* Houart, 1997**
Sulu Sea, Philippines
Apex 12(4): 121-124. Dec.

So far only found in the Sulu Sea area of the Philippines, the author makes the following remarks:

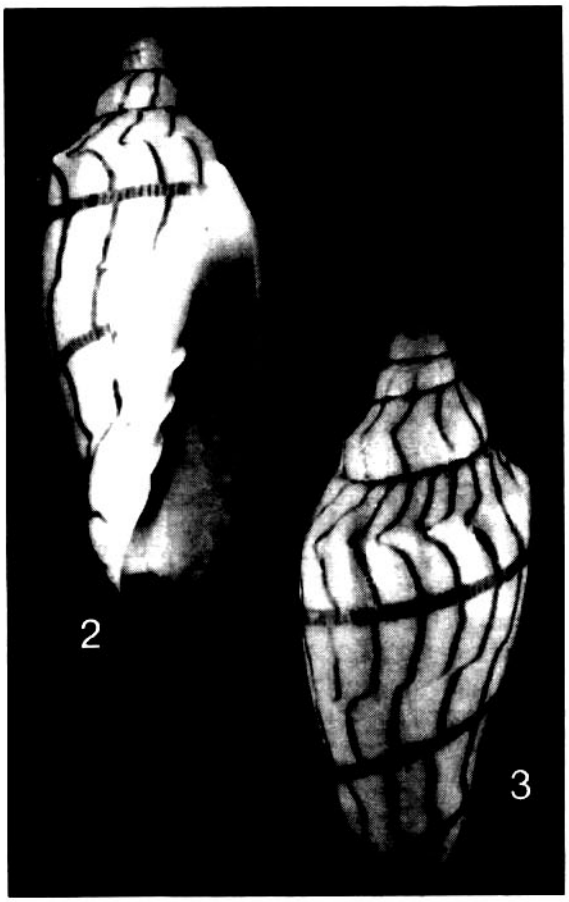
"*Pterynotus laurae* resembles *P. albobrunneus* Bertsch & D'Attilio, 1980, known from South Africa to Oman and south-west India. However, the shell of *P. laurae* is broader, especially the last teleoconch whorl. The spiral cords are broader and less numerous than in *P. albobrunneus*. *P. laurae* bears 4 or 5 cords on the shoulder of the last whorl, 9 or 10 on body, and 4 primary cords on the siphonal canal, while *P. albobrunneus* has 12-15 cords and threads on shoulder, 10 or 11 on body whorl, and 5 or 6 cords on the suphonal canal. It is also interesting to note the decreasing of darkness in colour from fourth to last whorl in *P. laurae* and the lighter coloured spiral cords, while the last whorl is darker coloured in *P. albobrunneus*, with a dark brown line on top of the spiral cords on almost the whole shell."

REFERENCE

Houart, Roland. 1997. Description of *Pterynotus laurae* n.sp. from the Philippine Islands (Gastropoda, Muricidae, Muricinae). Apex 12(4): 121-124. December.



Pterynotus laurae Houart, 1997



Paramoria johnclarki Bail & Limpus, 1997

***Paramoria johnclarki* Bail and Limpus, 1997**
Southern Australia
Apex 12(4): 109-115.

The authors describe the new species as being sympatric with *Paramoria guntheri* (E.A. Smith, 1886), but separable from it by the constant features shown in the following table:

REFERENCE

Bail, Patrice and Allan Limpus. 1997. Description of a new species of Volutidae (Gastropoda) from Southern Australia. Apex 12(4): 109-115. December.

	P. johnclarki	*P. guntheri*
Protoconch:	Dome-shaped, flattened	Dome-shaped, rounded
Shape:	Elongate fusiform, narrow aperture	Large, triangular, broad aperture
Plaits:	5	4
Pattern:	Stable. Axial lines hardly undulated. Posterior spiral band always equal to or stronger than the anterior band.	Variable. Axial lines hightly undulated. Posterior spiral bands rarely equal to but regularly weaker than the anterior band.
Animal colour:	Thin and regular orange. reticulation on cream background .	Thicker and more irregular reticulation on cream background.

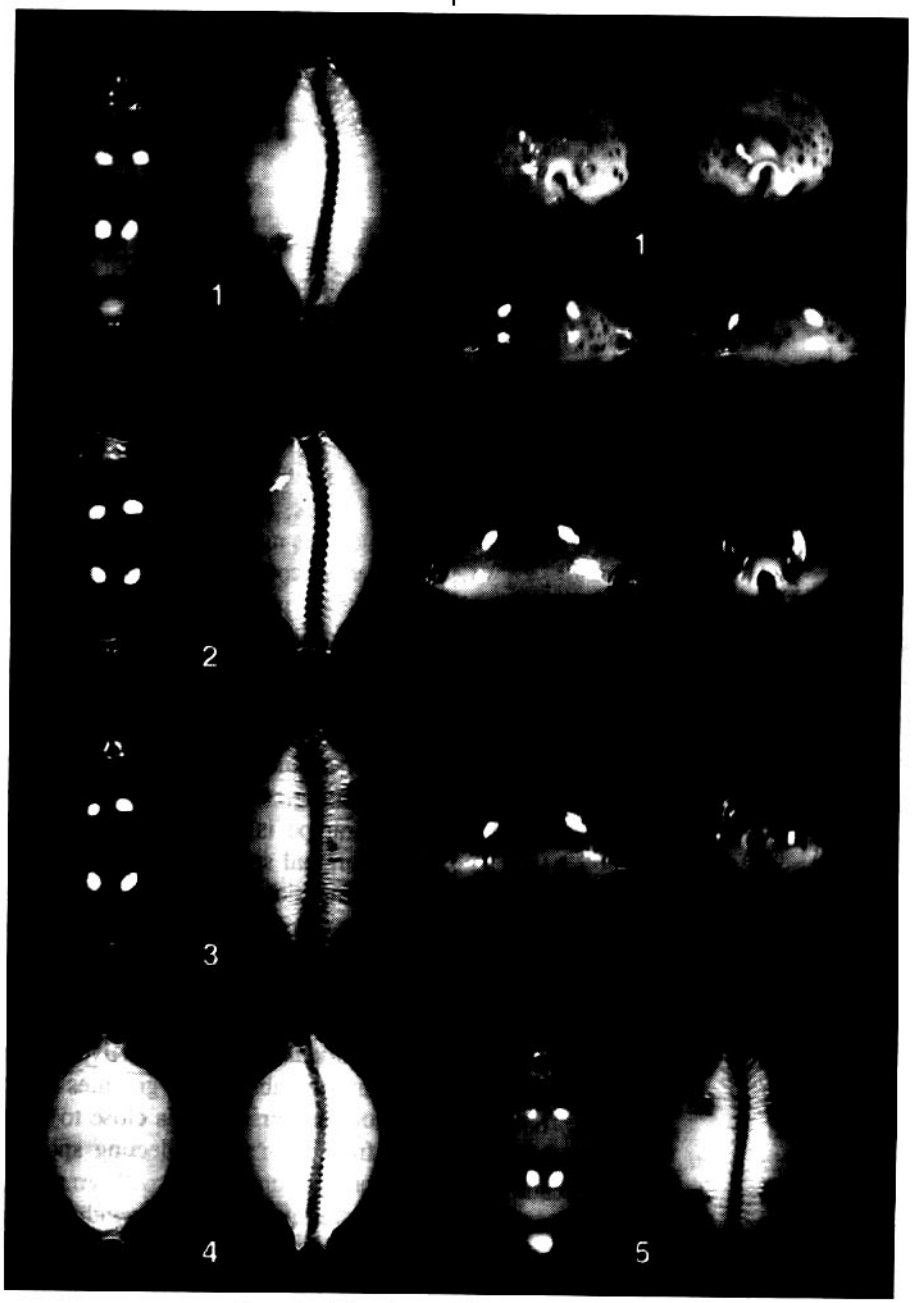
Table 1. Features distinguishing *P. johnclarki* from *P. guntheri*

***Pustularia jandeprezi* Poppe and Martin, 1997**
Samar, the Philippines
Gloria Maris: 35(6)

A new intertidal cowry from the Philippines! Confused with others of the group (*P. bistronotata, P. cicercula* and *P. nargarita*), research by the authors have led them to describe the new species. To help you, in case you have some mixed into the above species in your collection, we'll quote the entire description and remarks.

"DESCRIPTION: Shell thin, glossy, solid, porcellaneous, very globose. The general shape is oval-globular. The extremities are thin, solid and long. The teeth are fine and short. The callous on the base is thick, white to slightly olive coloured. Basal blotches may be present or absent. The dorsal colour varies from cream-white to olive-brown, most often with a middorsal blotch. The rounded dorsum is smooth and no specimens with dorsal granules are known. The teeth on the columellar side number between 20 and 25. The labial teeth between 21 and 28. The spire is prominent, even in heavy adults. A dorsal line is absent. Most shells have clear marginal spotting. that may occasionally be absent. One paratype is almost entirely white coloured, without marginal spotting, and with a pale middorsal blotch. Dimensions: The holotype measures 16.1 mm in length, 9.8 mm in width and 09.2 mm in height. Paratypes varie from 14.7 to 18.4 mm in length.

"REMARKS.- *P. jandeprezi* differs from other *Pustularia* by its distinctive and regular shape, colour and the absence of granules and/or a pattern of dots on the dorsum. It is close to *C. bistronotata*, which, from the same collecting spot, is always very dark orange, most often with granules, differently shaped extremities, and never with a white base. The spire is always hidden in *C. bistronotata*, and the teeth have

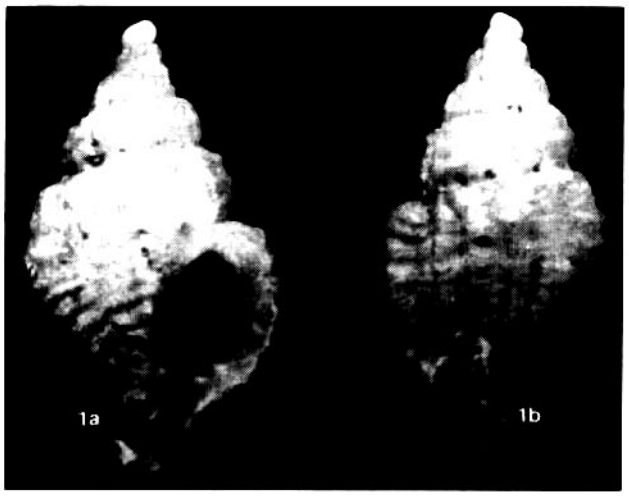


Pustularia jandepezi Poppe & Martin, 1997

a different shape and number. *C. margarita* most often has a smooth shell, but differs with its more slender shape and humped back. There is no link with the *Nesiocypraea lisetae maricola* (Cate, 1976), a deep-water species with a different shape, but also with a smooth shell of very similar coloration. The teeth, shape and size differentiate both immediately.

REFERENCE

Poppe, Guido T. and Philippi Martin. 1997. A New Species of *Pustularia* from the Philippines (Gastropoda: Cypraeidae). Gloria Maris: 35(6), 81-88. June.



Houartiella alboranensis Smriglio, Mariottini & Bonfitto, 1997.

***Houartiella alboranensis* Smriglio, Mariottini & Bonfitto, 1997**

Western Mediterranean Sea
Bollettino Malacologico: 32(1-4).

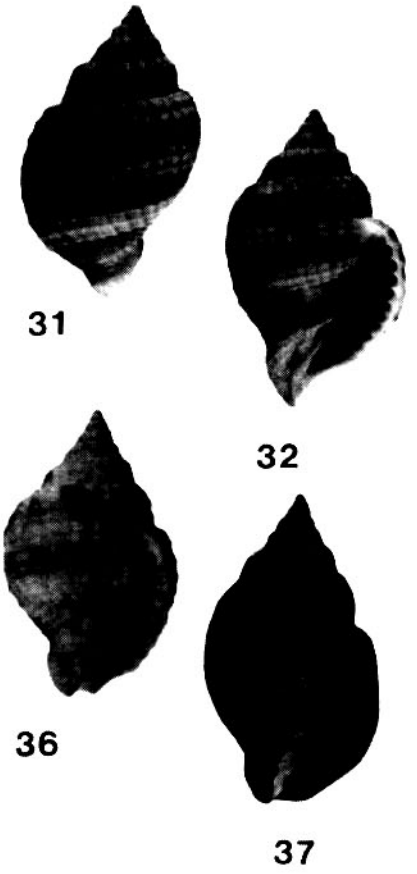
The authors make the following introduction to their new genus and species:

"During the screening of material from the Alboran Sea, Western Mediterranean Sea, we had the opportunity to find several specimens, lacking soft parts, and many fragments of a small muricid, which it was not possible to classify among the Mediterranean species of the family Muricidae Rafinesque, 1815. At first glance, the shell features strongly suggest to put this muricid in *Ocenebra*, subgenus *Ocenebrina* Jousseaume, 1880, but a more detailed examination of the protoconch and teleoconch morphology and a wider comparison to other members of the family, have led us to describe the species as a new taxon very probably belonging to the subfamily Trophoninae Cossmann, 1903. But within this subfamily, we could not find any appropriate Medterranean and African-Atlantic genus to fit in the new species, on the contrary we think there is a good correlation with *Conchatalos* Houart, 1995, a genus based on some Trophoninae deep-water species from the New Caledonia. We propose *Houartiella* n. gen. and *Houartiella alnoranensis* n.sp. as new to science."

The new genus is described as having shells up to approximately 7mm in length, four teleoconch whorls globose, with 7-10 axial ribs. The aperture is large and roundly-ovate, outer lip crenulated, siphonal canal short and straight. Sculpture with axial varice-like ribs crossed by obvious spiral cords.

REFERENCE

Carlo Smriglio, Paolo Mariotinni and Antonio Bonfitto. 1997 Description of *Houartiella* n. gen., Trophoninae Cosmann, 1903, and *H. alboranensis* n.sp. from the Mediterranean Sea. Bollettino Malacologico 32(1-4), 27-34. September.



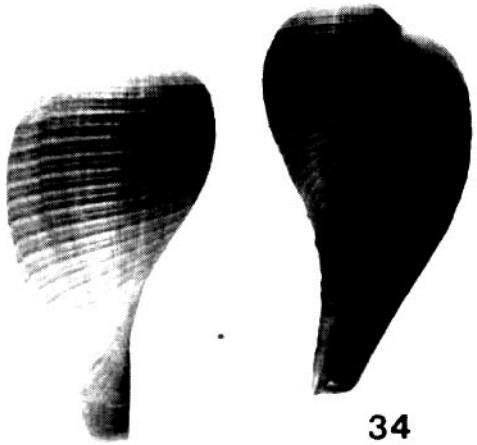
31 & 32. Holotype of *Cancellaria mediamericana* Petuch, 1998; 36. *Cancellaria reticulata* (Linné, 1767) and 37. *Cancellaria petuchi* Harasewych, Petit & Verhecken, 1992.

***Cancellaria mediamericana* Petuch, 1998**

Caribbean coast of Nicaragua and possibly Honduras.
The Nautilus 111(1), 35-36.

Another species of restricted range belonging to the complex centered around the widespread *Cancellaria reticulata* (Linné, 1767), so far this has been found only on the Miskito Coast of Nicaragua, but the author feels it probably ranges at least from the Honduran Miskito Coast to Bluefields, Nicaragua.

Dr. Petuch seperates his new species from *C. reticulata* in the following areas: (1) shell shape: new species more inflated with wider aperture; (2) columella - new species has only two columellar folds, with the large posterior-most fold being flatten-



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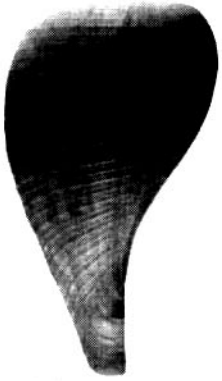

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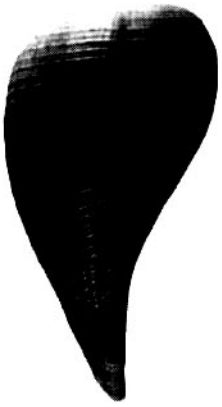

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Figs. 33 & 34. *Ficus villai* Petuch, 1998. Fig. 40. *Ficus lindae* Petuch, 1988. Fig. 44. *Ficus communis* Röding, 1798.

ed and keel-like, while *C. reticulata* has three folds with the large central fold being characteristically bifid in form; (3) protoconch - the protoconch of the new species is proportionally large, inflated, and bulbous with a slight flexure away from the main shell axis, while that of *C. reticulata* is proportionally much smaller, tightly cylindrical in form, composed of three whorls, and is aligned with the main shell axis; (4) color - in the new species, the shell is marked with three solid color bands, while in *C. reticulata*, the color bands are discontinuous, broken into a series of separate, large, rectangular maculations.

REFERENCE

Petuch, Edward J. 1998. The Molluscan Fauna of the Wawa River Region, Miskito Coast, Nicaragua: Ecology, Biogeographical Implications, and Descriptions of New Taxa. The Nautilus 111(1): 22-44. January

***Ficus villai* Petuch, 1998**
Caribbean coast of Nicaragua
The Nautilus 111(1):33-35.

Dr. Petuch compares his new species with several other figs: *F. communis* Röding, 1798, *F. lindae* Petuch, 1988 and *F. carolae* Clench, 1945. The last two comparisons won't be repeated here other than to remark that *F. lindae* has a paper-thin shell and *F. carolae* has been found only in deep water (200+ m).

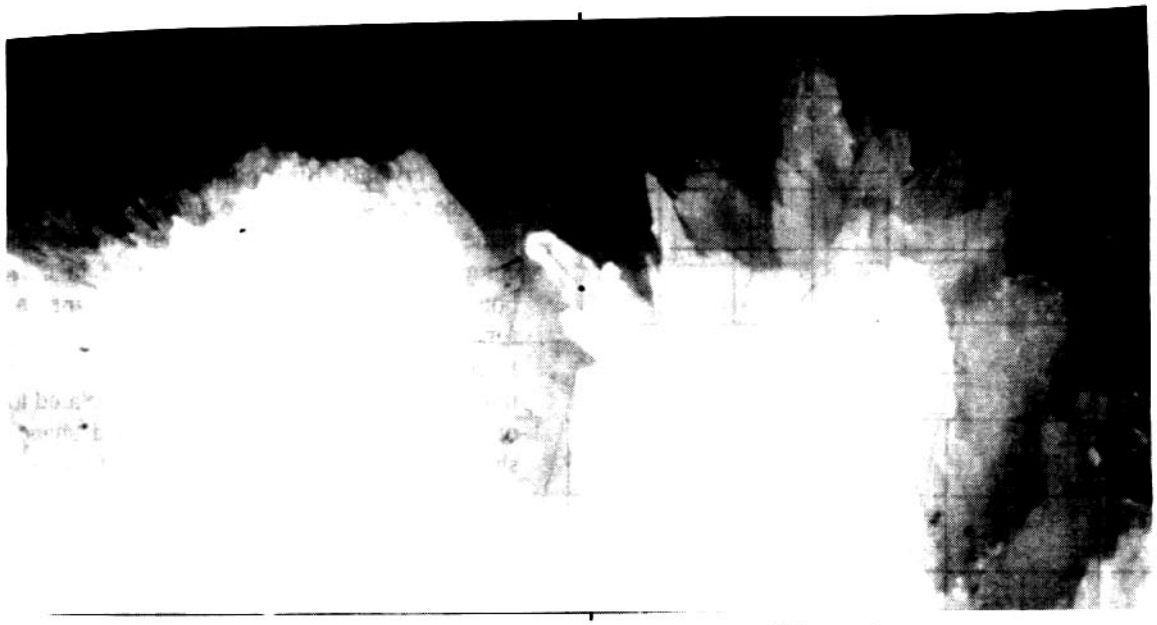
In comparing the new species with *F. communis* and *F. lindae*, the following points are made: (1) shell shape - the new species jas a proportionally more slender, less inflated shell with a higher, more elevated spire; (2) shell sculpture - *F. villai* exhibits a sculpture pattern of dominant, high-relief primary spiral cords, while *F. lindae* has much reduced, much lower-relief primary spiral cords with interstitial smaller secondary and tertiary spiral cords, a single reduced, secondary spiral cord, and no tertiary cords; (3) shell color - although both species have similar brown shells with longitudinal darker brown flammules, *F. villai* has a pale, whitish-tan subsutural area and a dark brown siphonal end, both of which are lacking in *F. lindae*.

REFERENCE

Petuch, Edward J. 1998. *ibid.*

SEEKING CLUES IN CLAY
ESSAYS FROM A MOLLUSC WATCHER, Continued

John Orr



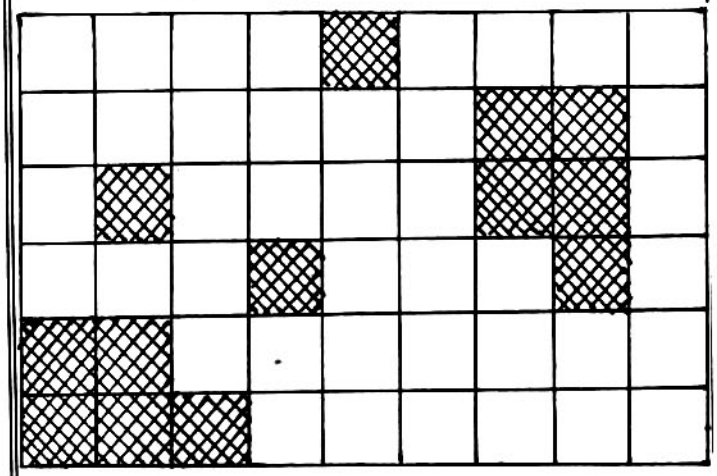
1. Two forms of calcium carbonate, calcite and aragonite, are shown here in the raw state. Both are found in the crystal structure of many shells.

The way in which molluscs seed and stack crystals of aragonite and calcite as building blocks within their shells could be related to certain components within primitive clays and muds from which the genesis of life might have originated.

This suggestion is based upon the hypothesis of chemist and crystalorgrapher Graham Cairns-Smith, who argues in his book Genetic Takeover that early organic replicating molecules - precursors of sophisticated DNA - gravitated from inorganic mineral crystals like those which form the components of primitive clays. One of the commonest of these is Kaolin (China Clay), wisely used to make ceramics. Sandstones or siltstones are also significant since they usually form the matrix upon which such clays synthesize. All clays form assemblies with a common property that enables them to crystallize from solutions derived from the weathering of rocks. What is more, crystal replication is spontaneous, as are the many minor flaws which arise within them. Erosive weathering separates flawed crystals into progressive or regressive groups via natural selection. According to Cairns-Smith's theory, as eroding crystals fracture or break away, their flows tend to be copied and reproduced in crystalline "offspring", thereby inducing variability, just as genetic flaws or mutations evoke variability via natural selection among living organisms.

According to the theory, a wide variety of organic molecules will bind to clays of one kind or another in one way or another, such as kaolinites, to form organo-clay complexes. In fact some inorganic clay silicates might possibly synthesize organic molecules and utilize them for influencing the success of future self-replicating crystal descendants. Relationships between clay crystals and self-replicating organic molecules could have gradually introduced more sophisticated dimensions of selectivity until the eventual emergence of DNA which in turn could then have taken over the budding evolutionary role of clays.

But whatever means clay crystals might have associated with self-replicating organic molecules, leading to the emergence of DNA, does not explain how the geometrical symmetry of mineral crystal morphology evolved. For no matter how many times raw inorganic crystals are melted and recrystallized from saturated solutions the same form of specific pattern or structure will always emerge. There are certainly no DNA codes, chromosomes or genes to influence "mechanisms" of their morphology. So what innate ionic forces come into play to evoke the expression of crystal forms be they raw rhombohedral calcite deposits or orthorhombic aragonite derivatives present in shells; trigonal crystals of the quartz/ silicate group that form the radula teeth; or octahedral



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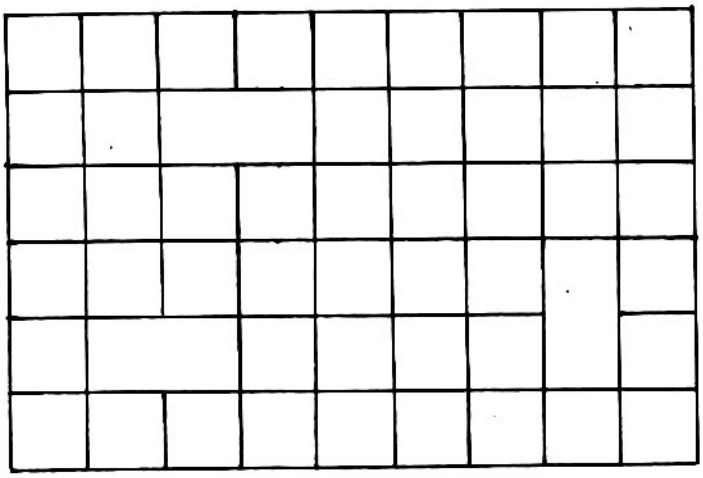

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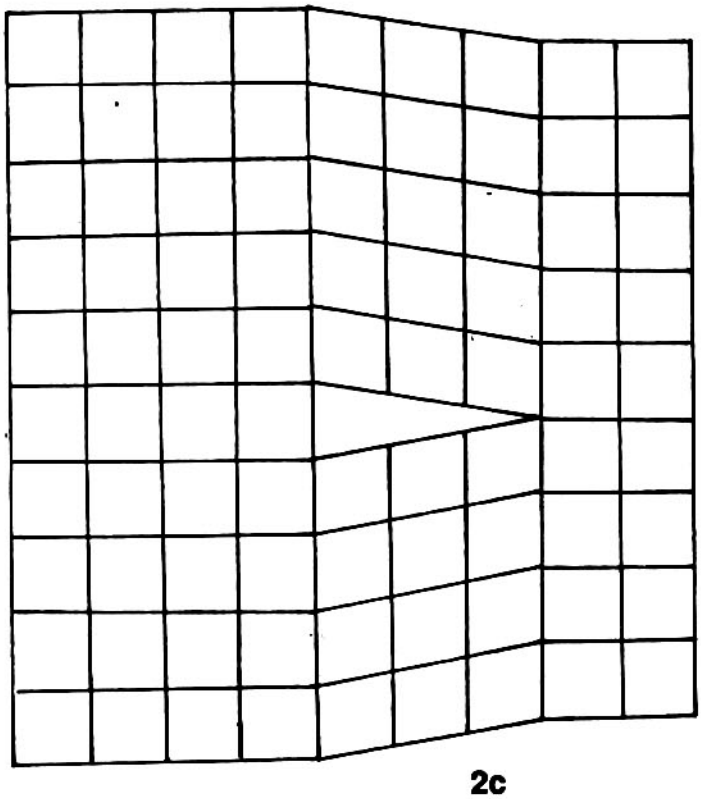


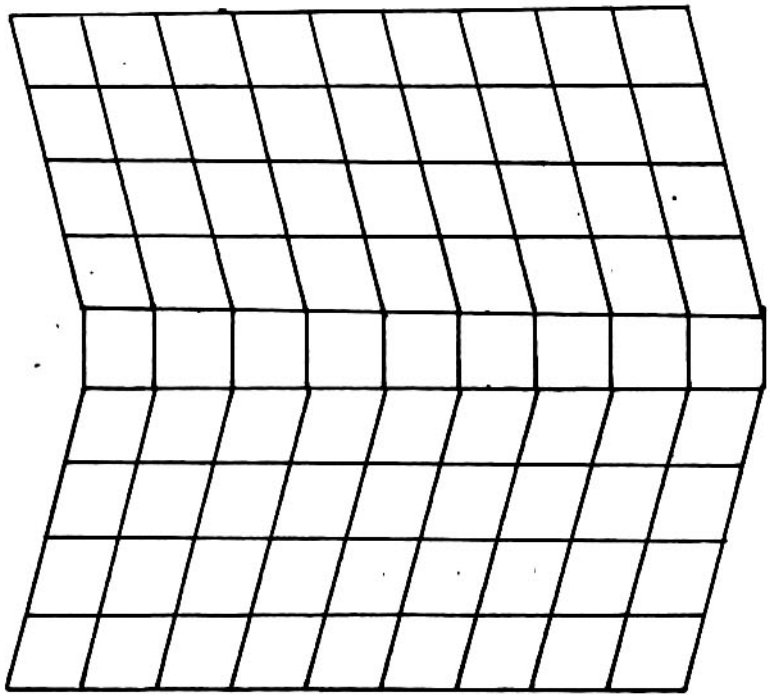
2c

crystals of reinforcing magnetite (found in igneous rocks) that sometimes cap them. Given that crystal shapes are symmetrical such forces would seem to stem from orderly rather than chaotic origins, though whether from simple or complex beginnings seems more questionable.

Perhaps morphic fields come into their own here with a meaningful part to play in the morphology of mineral crystals. But once this scenario spills over into the realm of shell-producing molluscs then the same phenomenon of crystal morphology is compounded by nature's unique role in correlating both organic and inorganic processes into a whole functioning organism embodying a snail and its shell. Even more significant is the way the process evolves three dimensions of morphology; one related to forms of crystals, another to the ornamental shape of the shell, and a third to the morphology of the snail itself which assembles it. Even though the bio-genetics of contemporary evolution must be involved in the development of molluscs, other forces that may or may not relate to the concept of morphic fields must be enlisted to make any rational sense of inorganic crystal and shell morphology.

Molluscs are by no means alone in using mineral compounds to build their spectacular shells and to forge rows of radula teeth. In fact they epitomize the way numerous other organisms across the face of the earth leach mineral and chemical compounds from the ingredients of their environments and then synthesize them into functional parts of their bodies. In fact, the scale of bio-mineralization is widespread, from bacteria to humans, and has a meaningful impact on global environments. Nonetheless, many compounds which organisms acquire from their surroundings are sooner or later returned to the environments from which they are taken, either in the form of decomposed tissues, or as skeletal sediments which accumulate as ooze, muds and limestone. You only have to look at the white cliffs of Dover to see a skeletal legacy of billions of shells that have perished as victims of environmental disturbances spread over millions of years of evolutionary time. So, in effect, an aspiring self-regulating planetary biosphere such as "Gaia" is sustained in a partial state of equilibrium by means of give-and-take between organisms and their environments. In this way organisms help to modify environments to suit their own needs and to adapt themselves better to their own surroundings and ecosystems.

2. Crystal mutations are equivalent to random mutations which occur in organisms and likewise, are subject to variability via natural selection. Some crystal mutations shown above are (a substitutions; (b) deletions; (c) insertions; and (d) twinning. (Courtesy C. Cairns-Smith)



2d

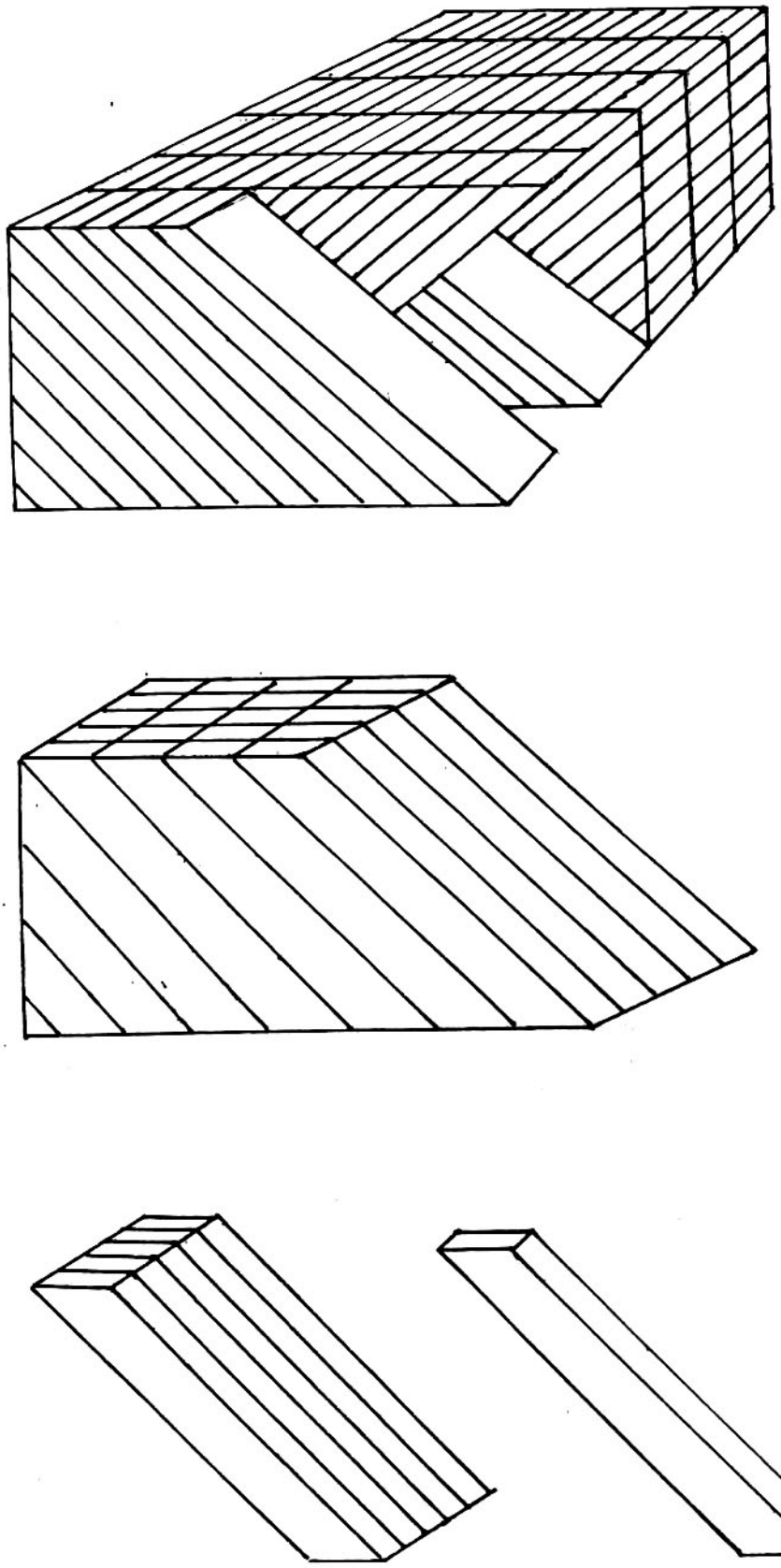
As organisms learn to appropriate substances from the environment to improve lifestyles within their ecological niches, animal technology developments can reach levels often strangely compatible with progress in human technology. For example, crystal spa (which is closely allied to the calcite component of shells) is used to make the lenses of sophisticated optical equipment. The microchip computer revolution followed. But long before human technologists recognized that the physical properties of silicon merited its use as a computer chip, nature was intelligently crafting mineral salts, as well as iron and magnetite together with chitin, into millions of tiny radula teeth for molluscs to use because of their unusual resistance to wear and tear.

Can we conclude, perhaps, from the living mollusc with its silicon teeth and shell of calcite/aragonite crystals that the genesis of life may have been based on clays instead of on large organic molecules? And what of the possible presence of Kaolin traces assimilated into the crawling foot of some primeval molluscs ... notwithstanding abundant living specimens of the boring bivalve *Petricola pholadiformis* (a Piddock) which even now are spending their cheerless grey lives entombed beneath our very feet in widespread beds of primordial clay?

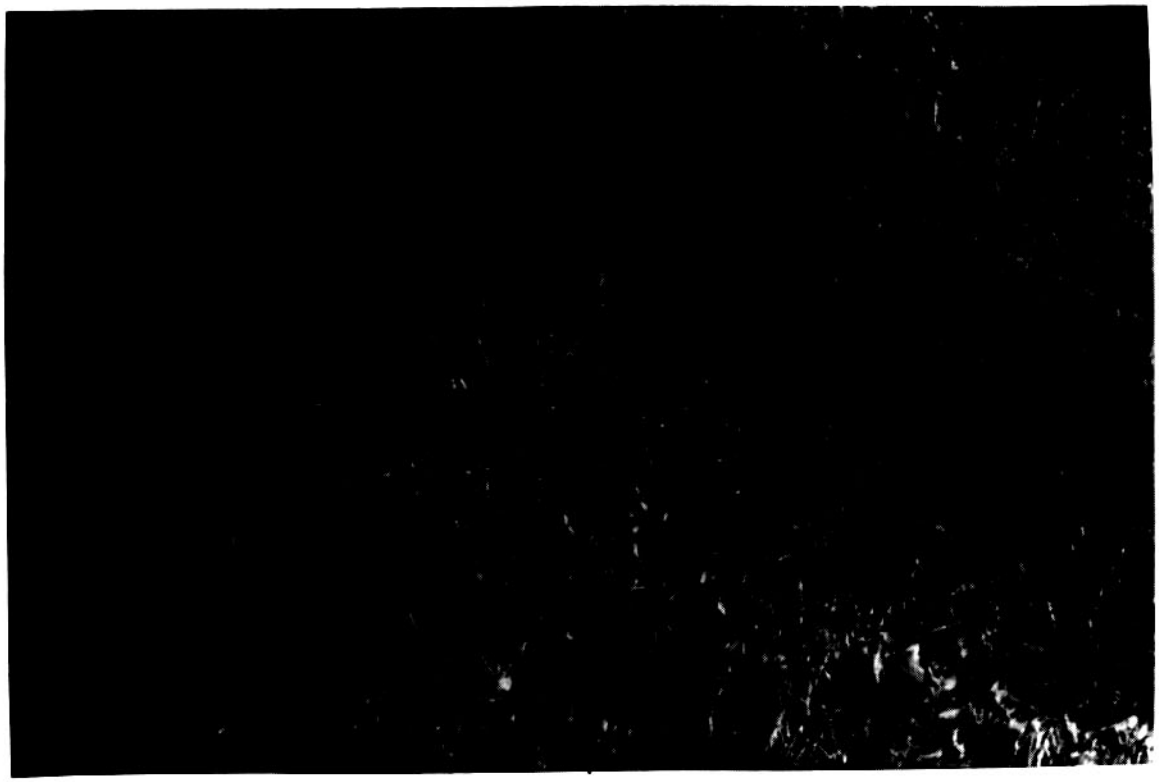
Adding "A" to Symmetry

The argument about left-handed people being physically or intellectually inferior in some way to the right-handed majority continues unabated. But we might do better to seek and answer in other areas of existence. For when we descend to the molecular level of life and evolutionary development we find that left-handedness dominates the scene. In fact, left-handed asymmetrical twists are inherent in all the basic units of life, from the DNA helix and self-replicating molecules to the amino-acids which are the building blocks of all proteins.

We tend to assume that bilateral symmetry, like that shown by the external human form, is more refined and progressive than morphological asymmetry, if only because from our human viewpoint the former exemplifies functional design, whereas the latter implies disorderly imperfection. But strip away the outer skin from our bodies and we would be hard put to find inside anything more asymmetrical than the shapes and deployment of our functional organs. But there is nothing basically flawed about this asymmetrical arrangement, any more than there is about the asymmetry of life's building blocks. Likewise with certain breaks in the uniformity of some molluscan radula teeth. For example, although radula teeth of different species within relevant families of gastropod



3. This diagram shows how shell crystals of calcium carbonate form into crossed lamellar structures. The framework is very strong and one of the commonest crystalline features of shells. Significantly, the same basic patterns can be found in primitive clay minerals. (See essay Why Mantles Matter)



4. This crossed lamellar structure of crystals is shown in a cross section of a cowrie shell and is a common feature of crystalline geometry in shells. (See essay Why Mantles Matter.)

snails all conform to sets of geometrical patterns, the central tooth doesn't always have a bilateral symmetry. Sometimes one or more cusps are missing altogether, as in the radula of limpets (*Patella*) or in the family of sand-dwelling *Ancilla* shells. Neither do unified organisms necessarily function any more effectively because the their symmetrical design in relation to their indigenous environments.

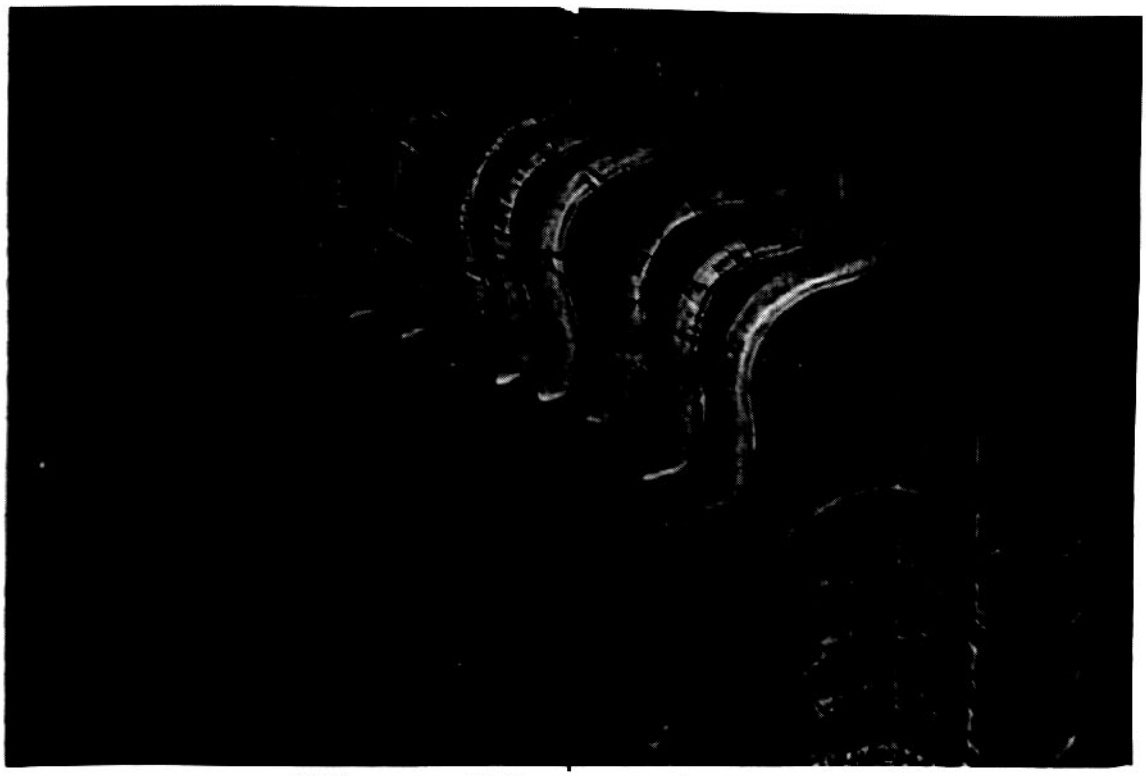
Twists and Turns of Torsion

Though Slit Shells (*Pleurotomaria*) may be masterpieces of ornate spirals, the snails within them, like all gastropods, are coiled by torsion. Indeed, torsion is unique to molluscs and transforms all gastropod body plans into asymmetrical helical designs of huge benefit to their survival. It was an evolutionary "twist" crucial to the fortunes of gastropods, since it eliminated risks of fouling their reproductive organs and enabled them to inhale clean water. Torsion also allowed the sensitive head region to withdraw into the shell aperture if threatened, before instead of after, the more rugged foot and subsequently to improve the way they monitored their surroundings by congregating all sense organs at the front. Torsion also first came to the rescue of the newly-hatched pelagic larval forms (veligers), probably aiding their survival even more than adults because it offered them the first-ever opportunity to withdraw into their tiny shells head first.

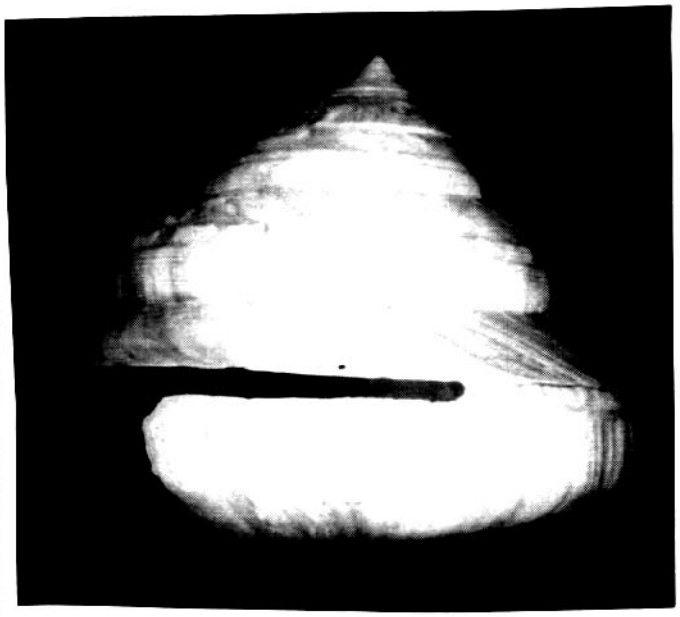
Torsion first gave a "kick-start" to the outstandingly successful evolution of the molluscan phylum during the early veliger larval stage of a shell's development when muscles, running from the head to the foot, grew asymmetrically from a mutation (or in response to an environmental stimulus). The contraction this caused later twisted the shell and larval body around 90 degrees in an anti-clockwise direction concluding the first stage of torsion.

The second stage, which completed the 180 degree twist to place the mantle cavity above and in front of the head, arose more gradually, spearheading - together with the aid of natural selection - the spectacular environmental advantages for survival of feeding, feeling and gill-breathing facing forwards in clear water. In fact, asymmetry became more pronounced through all adaptive evolutionary stages until the best solution was reached in the modern pectinibranch gastropods which form the majority of today's species.

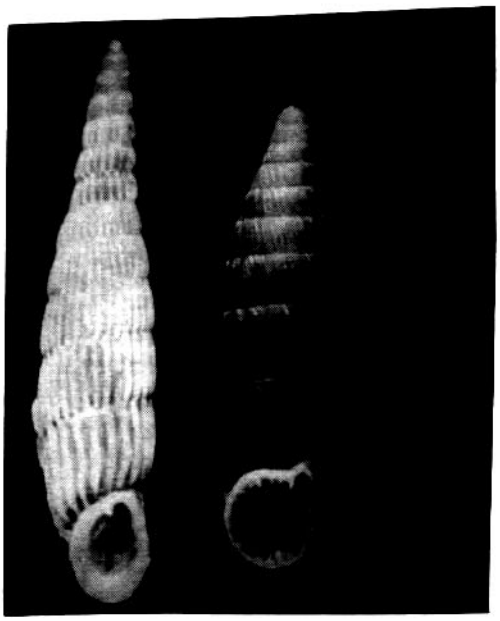
5. These chemical crystals are growing on a microslide. No matter how often the patterns of crystals change on re-seeding (by repeated heating and cooling) the basic characteristic shapes of the crystals never alter.



6. The asymmetrical arrangement of cusps adjacent to the central one on these rows of teeth were dissected from the radula of a sand-dwelling *Ancilla* snail.



7. This *Pleurotomaria africana* is a living fossil of one of the earliest "slit" shells to undertake coiling by torsion. They are rare and dwell on the seabed at twilight depths up to 350 meters.



8. Despite the merits or demerits of left and right handedness, sinistral molluscs have survived for millions of years. Indeed. left-handedness is a consistent feature of certain families like these tiny claudisium land snails.

Genetic Quirk

In addition to having undergone torsion, the large family of *Clausilid* land snails are, in effect, all asymmetrical insofar as their apertures are sinistral. They certainly don't seem to be handicapped in any way by this genetic quirk. On the contrary, natural selection must have smiled upon them in the same way, since all of several hundred species seem to thrive in Asian, South American and European habitats. More remarkable is a fairly widespread group of African freshwater snails belonging to the genus *Lanistes* which are ambidextrous in the sense that the shell is left-handed and the snail right-handed. Perhaps being "uniformly" ambidextral is a more symmetrical function than being only one or the other.

Clearly, the tendency seems to be for more primitive snails to have both complex symmetrically designed radulas and shells (limpets excluded); whereas more sophisticated snails have simple radulas and streamlined shells, or sometimes no shell at all. Can we assume, therefore, that if survival is considered within specific environmental parameters, complexity often precedes simplicity on the evolutionary time scale and that asymmetry need not be disorderly, or even of badly flawed design?

Given that some gastropods thrive with asymmetrical radulas and body plans then asymmetry as well as symmetry, in the widest sense, would appear to be useful forms of morphological expression, bearing in mind that asymmetry also appears in spiral forms as with the DNA helix model. We might even go further and say that a pageant of spirals is inherent in all nature, whether consisting of variations at one extreme on the invisible components of atoms; or at the other, in the vast galaxies of cosmic space... Not forgetting that some of the most elegant and refined forms of the spiral are expressed in the aesthetic profiles of many shells designed by unpretentious molluscs.

REGENERATION or DEGENERATION

Decapitate a chicken. Although the torso will run about for a time another head won't grow. But decapitate a worm and a new head will develop. The know-how within an organism to "bud" or grow again a lost limb is surely a process to be envied by humans who much perforce hobble around on crutches, dwell in a "blind" alley aided by an affectionate guide-dog, or be relegated for life to a wheelchair... all because eyes, legs and arms won't grow again after loss through injury or disease . Red blood cells, bone, skin and nerve tissue do regenerate in humans, it is true,

9. Many shell designs mirror spiral forms inherent throughout nature... graphically expressed here by the unique *Thatcheria mirabilis* commonly known as the Japanese Wonder Shell.

but in a limited way compared to thriving regenerative processes among less complex creatures. Why this should be so still remains a mystery, except that it is known to be associated with the presence or absence of certain chemicals and regenerative cells called blastomeres. But from where did these appear?

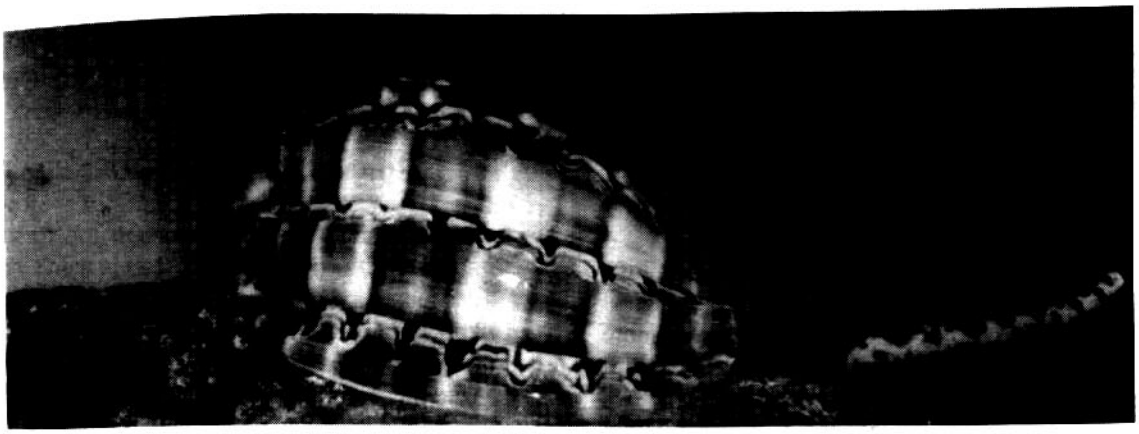
Snails can be very prone to regeneration. A veteran Tiger Cowrie (*Cypraea tigris*), living in one of my aquaria, had the right eye and tentacle, upon which it was mounted, removed by underwater surgery for optical research into its visual acuity.

Anyone who thinks it is wicked to deprive a handsome Tiger Cowrie of sight in one eye, let alone keeping the snail in captivity, would be wrong because within three months the animal's "budding" cells had regenerated an impeccable new tentacle and eye-stalk complete with a fully functional eye. What is more, it continued to thrive for another two years on a diet of algae, detritus material and fresh bivalve tissues which it learned to relish as nutritional protein in captivity.

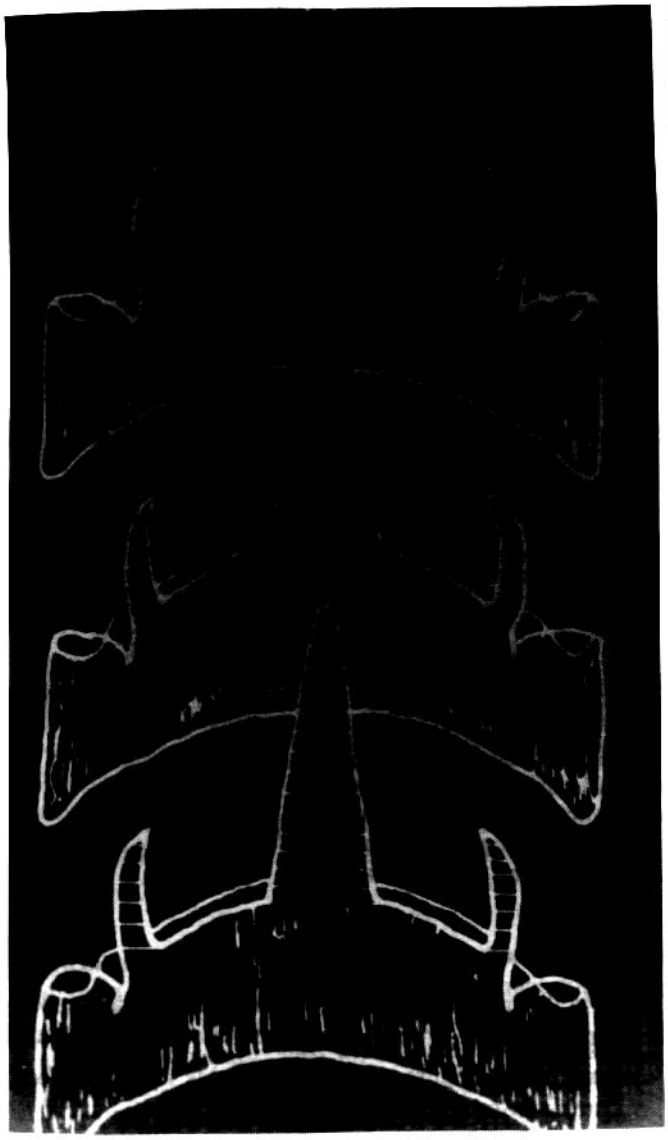
Autotomy

Regeneration sometimes serves two purposes: to restore a lost limb and at the same time to use the discarded appendage as a decoy against certain predators. The practice is known as autotomy. Several marine gastropods shed part of their foot, but the most striking example is the outsize foot of snails belonging to the family of Harp Shells (Harpidae) of which there are only about two dozen species. If threatened in any way a harp shell will often shed part of the foot at the rear end which then proceeds to float about still pulsating as if alive. This distracts the attention of a crab or fish predator away from its quarry, allowing the snail time to withdraw into its shell (which would be too bulky if the whole foot were retained) or to creep away unnoticed. Meanwhile, in a matter of weeks a new part of the foot is regenerated so that the snail can continue to crawl about hunting its prey in order to survive. Autotomy then, is a survival ploy and in noway can be regarded as regressive or purposeless.

A harp shell's tiny radula ostensibly reinforces this "purpose". Yet it is so minute - a centimetre long - compared to the size of the relatively massive snail,



10. This *Harpa major* is one of a small family of mostly large shells which practice autotomy - a defense strategy of jettisoning part of their immense foot if unduly disturbed.



11, The harp shell's rachiglossan radula - about a centimeter long - is so small for such a large animal that its functional role is puzzling. The median tooth is magnified several hundred times.

that any function as a utilitarian implement for feeding seems irrelevant and obsolete, especially as the large foot plays such a significant predatory role by way of acting as a voluminous fleshy pillow which envelops and smothers prey including other molluscs, worms and small organisms. This is assisted by copious secretions of solvent mucus which probably softens the victim's tissue to render it more digestible. On the other hand, it is quite possible that the minuscule claw-like teeth could aid the softening-up process by severing certain tough membranes of prey.

Complexity or Simplicity?

How does cellular differentiation, regeneration and metabolism mesh to produce an elegant, meaningfully functional "whole"? The driving force behind regeneration seems to behave as if aware of an objective towards wholeness without any trial and error. This is the essence of vitalism which recognizes a purposeful life principle or "energy field" that steers development of organisms towards normal adult functional form. Regeneration is regarded as a persuasive expression of this theory and exponents often cite common flatworms as spectacular examples on the grounds that living organisms have a wholeness about them which is more than the sum of their parts (if a flatworm is cut into pieces, each fragment is able to develop into a new worm) as opposed to the neo-Darwinist mechanistic school of biology which sees evolution as the rigid inevitability of an automated gene "machine" (often computerized) that can only ever be the sum of its own parts.

The Vitality of Vitalism

Vitalism is still pooh-poohed by many biologists as the legacy of superstitious animist trappings of the past, no longer valid in the present era of "rational" materialism. But vitalism will not go away and is consistently reasserted by living evidence of regenerative divisions at many levels of life. So the neo-Darwinist answer is the "feeling" gene devised by computer programs which, oddly, endow it with the self-same purposiveness of vitalism as well as mind-like properties that not surprisingly mimic the human minds that devise it. But such programs stray a long way from the innate spontaneity of vitalist regeneration and evidence of interacting, self-sustaining organisms that can cooperate as well as compete for survival under the umbrella of true Darwinian natural selection.

To say that regular genes control sorted codes for randomly triggering organ-forming messages to blastomere cells to induce regenerative processes, neither tallies with Darwinian random selection, nor tells us how or why these controls regulate the direction invariably towards regeneration instead of away from it. Moreover, the form and shape of regenerated organs or appendages - which are virtually duplicates of original ones - must be closely linked to the perplexing and still unexplained dilemma of morphogeneses... which brings us back to the shape of that tiny radula secluded within the proboscis of the harp snail.

12. Spot the shell. Self-effacing colours as effective as those ornamenting this tiny false cowrie, *Pseudosimnia punctata*, here feeding on its matching vermillion host coral, seems innately sensible if we are to assume there is a purpose in such exotic forms of camouflage.

If the premise holds true that complex radulas indicate a primitive stage of evolution, and simple ones a more advanced level, then the design of this radula could be relatively modern. On the other hand, the size, lifestyle and ornamentation of this flamboyant gastropod certainly seem difficult to equate with a structure of such minuscule simplicity. Moreover, the tiny teeth, strangely, seem to be the same size in large and small specimens. This could signify that, pro rata, they may be getting smaller like most structures that eventually become obsolete (i.e. operculums). In any event, none of us living today will ever know for certain whether this radula is destined to grow bigger and more functional, or eventually disappear altogether... say about 100,000 years from now.

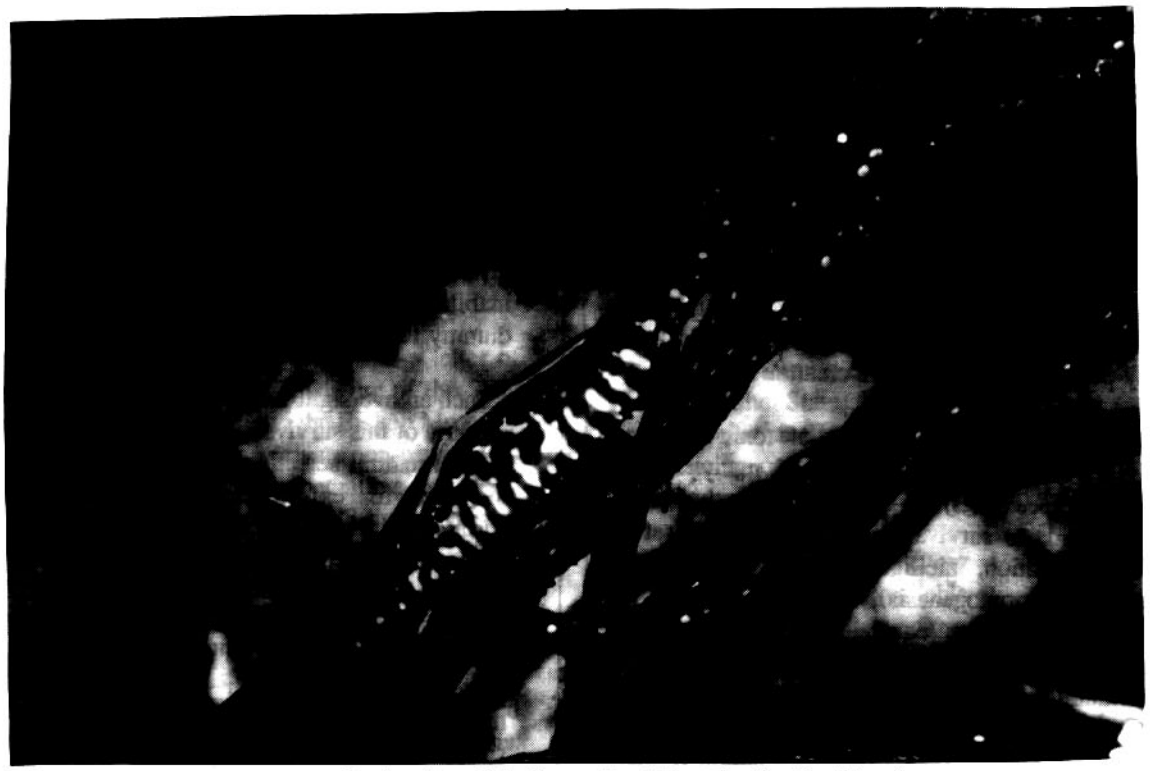
POINTS OF VIEW

Zoologists tell us that the metabolic pace of small animals tends to be faster than that of large ones. Consequently, small hearts will beat quicker and, by expending more energy, wear out sooner; so that a lively metabolism equates with a shorter lifespan and a slow metabolism with a longer one.

In the more abstract sense one week - a man-made unit of time - merely expresses succession without any past or future except as thoughts related to the present. So how, we might ask, does a fitful butterfly equate its lifespan measured in days... or shorter still, a Mayfly which is born at dawn and dies at dusk? Perhaps an hour on our timescale could conceivably seem like a week to a Mayfly. By the same token, what a day might mean in the life of a small snail, so relaxed and leisurely, is anybody's guess. All snails, whether aquatic or terrestrial, large or small (some so minute as to be almost invisibly to the naked eye), are presumably subject to the time/lifespan equation.

As for intertidal marine snails, we would expect relatively small, fast-moving and aggressive carrion feeders like sand-dwelling dog whelks (Nassariidae) or burrowing olive snails (Olividae) to lead shorter lives than the slow tritons, conches and some cones (Cymatiidae, Strombidae and Conidae) with relatively weighty, cumbersome shells to carry.

We can only speculate about how snails may interpret time and lifespans since inseparably different levels of intelligence and scales of observation exist between us and less complex creatures. For example,



13. Another "false" cowrie of the Family Ovulidae is equally well camouflaged in its natural habitat of gorgonian corals.

we might assume that size and volume ratios probably make a raindrop resemble a lake to a ciliated micro-organism thrashing about inside it. But we can never really know because what we are doing in effect is to superimpose our intelligent human scale of observation onto a minuscule organism which probably (we don't know) is only able to interpret its surroundings instinctively, using an IQ to match simple survival needs in a rudimentary environment.

Meanwhile, at the other extremity, humankind has added dimensions to life embracing much more grandiose environments. One stipulates that all life would promptly perish unless the finely balanced ratio between carbon and oxygen in the air remains precisely fixed; another confirms that the ozone layer above our atmosphere successfully masks lethal concentrations of UV light from reaching the earth. But how are critical levels of ozone and carbon/oxygen ratios initially controlled at such a consistently refined pitch to ensure that we and all living creatures, including snails and microbes, remain alive? Is it all chance and coincidence or is some intelligent regulating process at work that aims to establish a form of steady-state equilibrium - a form of intelligence equal or superior to ours? Certainly those internal bodily functions operating autonomously in all living organisms cannot have evolved from random chance without the intervention somewhere along the line of a reasoning, refined perceptiveness; even less likely to have evolved from pure chance is the eye, developing from the simple organs of those Burgess Shale curiosities, to fully developed incredibly ingenious data-processing mechanisms, so sophisticated that they match the high technology of a modern video camera.

However, manifest intelligence involved in the development of eyes doesn't necessarily rule out elements of incidental chance from certain evolutionary processes such as the random occurrence of some all-important mutations. Likewise, the flawed end-effects of many mutations which can be regressive or harmful do not exclude intelligence from natural selection any more than trial or error exclude intelligence from scientific experiments. On the other hand, examples of natural selection acting upon mutations progressively and intelligently seem too persistent to be due exclusively to accidental chance as neo-Darwinists would have us believe. What is more, natural selection seems able to somehow evoke purpose in the behavior and structures of living organisms. It has grafted on to evolution countless, often complex, survival features as well as selecting

for rejection traits that turn out to be harmful or regressive. Take shapes and color patterns ornamenting many molluscan shells, and numerous other different creatures. as aids to survival by way of camouflage, mimicry or deception. How, without a measure of intelligence, could natural selection have utilized colors and shapes so as to form highly effective self-effacing patterns which disguise countless organisms in their habitats? Some say effective camouflage only comes into its own by chance when an animal strays inadvertently across matching backgrounds. In fact, such self-effacing backgrounds are usually permanent features of a creature's habitat.

Take as another example rows of toxic defense glands beneath the mantle skirts of many Doric nudibranchs (sea-slugs); to the extent that these are functional aids to survival they must be purposeful and, by association, intelligent. As for morphology (biological morphogenesis), neo-Darwinism is especially difficult to equate with this stage in evolution because although it can explain cellular differentiation by controlled protein synthesis, it cannot account adequately for the unfolding or emergence of characteristic organic structural forms: why a heart is always heart-shaped, a hand always hand-shaped with five, not six digits ... or a snail's tentacle always tentacle-shaped for that matter. And why do certain species of snails, in addition to possessing two or four tentacles around the delicate head region, sometimes grow an additional pair of realistic dummy ones protruding from the rear of the foot? This is the least vulnerable part of the body, yet most susceptible to attack from predators, given the snail needs to spend as much of its time foraging for food exposed above, instead of hidden below, the sand. A random stratagem or yet another of Nature's many ingenious ploys? But perhaps not quite so ingenious as it has a single curious flaw which can give the game away to inquisitive predators; the inability of the snail to crawl backwards so that the dummy tentacles appear to move forwards.

Such an oversight seems at first to largely defeat the purpose of this survival ploy. But nature is not perfect though natural selection may aspire to be so. Hence the need for experimental trial and error on the variability of imperfect or flawed organisms arising from mutational traits like the back-to-front ploy of dummy tentacles portrayed by certain marine snails. Perhaps in the fullness of time (evolutionary time) another gene may mutate spontaneously to initiate a more realistic illusion of "forwardness"; but meanwhile, flawed as the dummy tentacle is, the snails continue to flourish in their shallow, sandy habitats indicating that at least it has some worthwhile survival value ... indeed, probably a good deal more than the five percent resemblance to a turd of Stephen Gould's dung beetle - though even that it certainly better than no resemblance at all.

continued from page 8

Nov. 21-22. **3rd Intenational Shell Show and Symposium.** Erasmiaans Gymnasium, Wytemaweg 25, Rotterdam, the Netherlands. G.J. Guiden, Vrijland 19, NL-3271 VH Mijnsheerenland, the Netherlands. (31)(0)186.602386; fax: 10.4367693 or W. Faber; van Alkemadelaan 938; NL-2597 BG Den Haag, the Netherlands. Tel/Fax: (31)(0)70.3551245. E-mail: Spirula@pi.net

June 21-26, 1999. **16th Baltic Marine Biologists Symposium** Klaipeda, Lithuania. Secretariat: Centre for System Analysis; Klaipeda University; Manto 84, LT-5808 Klaipeda, Lithuania.
E-mail: bmb16org@hgf.ku.lt

Information from various sources, including Donald Dan, COA Award Chairman; 2620 Lou Anne Court; West Friendship, MD 21794. (410) 442-1242 or 1942.

A TALE OF SNAILS

During a stay in a North African country, a friend collected some small land snails. The snails (still alive and closed by an operculum) were put into alcohol and stayed there for three weeks. After that they were thrown into a bleach solution and forgotten. Again three weeks went by until the owner of the little snails remembered them, took them out of the bleach and put them into a box to let them dry. After some days he finally wanted to take a close look at them for identification and found the box empty. The snails were all gone! He then discovered them - sitting on the wall of his livingroom!

(posted on the internet by Christa Schmidt - repeated from a story by Georges Markens in an article in Informationen of the German shell club)

Another Museum Has Problems

The Bishop Museum in Honolulu, Hawaii may lose its state funding, which constitutes a major portion of the museum's day to day operating costs. As much as 25% of the staff may be cut if the proposed cut in funding goes through.

Dr. Robert Cowie, on the internet, posted the following plea.

"I am writing to request that you write a letter of support to the Governor and Legislature of the State of Hawaii to continue funding to the Bishop Museum. Although Bishop Museum is a private non-profit institution governed by a self-perpetuating board of directors, we were designated in 1988 by the Hawaii State Legislature as the State Museum of Natural and Cultural History. This designation brought regular state funding to Bishop Museum. In 1992 this amounted to ca. $2.5 million (16% of our total revenues). During the past several years our current governor, Benjamin Cayetano, has steadily decreased support to the Museum because of a state fiscal crisis. During this current fiscal year we are due to receive $805,000. This represents a decrease of 67% since 1992. And now the state budget director is reportedly threatening to withhold that funding beginning 1 July 1998.

This could have devastating consequences on our ability to get grants and obtain other support that have allowed us to maintain research and collection activities despite a yearly loss of $1.7 million in state funding since 1992. The $805,000 that has been appropriated by the legislature for FY 1999 is absolutely essential to the continuation of those activities.

Those of you from other museums will immediately recognize that our current level of funding from the State of Hawaii is low compared to most other large, free-standing museums. This is a source of considerable frustration to us, given the importance of our collections and associated activities to the citizens of Hawaii. The absence of predictable state funding was one of the major reasons for passage in 1988 of Act 398 which designated it as the State Museum. Although it now appears that the Cayetano administration will not succeed in recent efforts to remove funding provisions from Act 398, the Governor could still withhold all but one dollar of our FY 1999 appropriation of $805,000 and still meet the provisions of that legislation. Your testimony is essential if we are to receive this current support and eventually increase the level of support in the future.

You can help us by writing or emailing a letter of support to the governor highlighting the importance of our collections (23+ million items) and associated research activities. ... It is important to take a constructive approach and to indicate that you understand that the State is trying to solve a serious fiscal crisis, but that withdrawing support from Bishop Museum is a short-term solution that simply does not make long-term economic sense. Our ability to identify agricultural and other pest species, provide expert guidance to resource management agencies, and assist State agencies in innumerable other ways all have a strong economic basis. In addition, even though the State funding we currently receive is relatively small, it provides a crucial match to obtaining out of state grants and other support that increases the investment of this funding many fold.

Additional details on our Hawaiian Biological Survey program are available at
http://www.bishop.hawaii.org/bishop/HBS/

Please address letters to:
Governor Benjamin J. Cayetano
Executive Chambers
Hawaii State Capitol
Honolulu, HI 96813
Phone: (808) 586-0034
Fax: (808) 586-0006
email: gov@gov.state/hi.us

Please also send copies of your letters directly to the leadership of the Senate and House (Honorable Norman Mizuguchi, President Hawaii State Senate and Honorable Joseph M. Souki, Speaker of the House, Hawaii State House of Representatives - both at State Capitol, 415 Beretania St., Honolulu, HI 96813) or send a copy of your letter to Tracie Mackenzie, Department of Natural Sciences, Bishop Museum, 1525 Bernice St., Honolulu, HI 96817 (Phone: [808] 847-8204; Fax: [808] 847-8252; email: tracie@bishop.bishop.hawaii.org) and we will copy and forward.

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http://www.bishop.hawaii.org/bishop/HBS/cowie.html

Bishop Museum research - the quest for new knowledge in cultural and natural history - is a vital investment in the future of the economy and

environment of the state. Through research, we come to understand our world and learn to preserve and manage our cultural and natural resources. If we neglect our natural resources, tourism will decline, our best and brightest people will leave the state and we will be in an even worse economic calamity than we are today. Bishop Museum research is an important element in preventing this tragedy.

In 1992 Bishop Museum was designated by the state as the Hawaii Biological Survey (HBS) and charged with the task of developing a complete inventory of our plants and animals. This important Museum program, which has been highly acclaimed by the scientific community, is supported largely by federal grants and national foundations. As a result of leadership, Hawai'i is the only state in the union with a comprehensive biological survey (all organisms, terrestrial, freshwater and marine), and the only state with an accurate, constantly updated list of the plants, animals, and microorganisms within its boundaries. This information is crucial to a wide range of activities including environmental management, outdoor recreation, and the development of biotechnology. A testament to the usefulness of HBS to the community is that the HBS website received over 170,000 hits by users of its databases, endangered species information, and educational information during 1997.

Museum researchers provide a significant financial return on the state's investment. During 1997 alone they brought in to the State of Hawai'i's economy 6.2 times their salaries in national and international funding, obtaining a total of $2.2 million in grants (17 funded out of 18 applications submitted). This places us at the top of museums nationally. Much of this funding is awarded through intensely competitive national and international granting programs. The State's annual appropriation to us, which demonstrates a local commitment and provides a financial match to many of these grants, is absolutely essential for obtaining and continuing this out-of-state support.

State agencies have local access to world-class experts at Bishop Museum who provide identification and other scientific services that are essential to the interpretation of cultural sites, control of alien organisms including agricultural and household pests, and to the preservation of Hawaii's endangered species. In many cases state agencies would not be able to do their jobs without Museum help. For example, our quick response and scientific detective work in 1995 was crucial to preventing the establishment of sand flies in Hawai'i. The establishment of these beach-dwelling biting insects in Hawai'i would have had a devastating effect on out multi-billion dollar tourist industry.

Bishop Museum is an important reason that Hawai'i is seen as a world leader in efforts to combine research findings with information management, and to translate this into useful products and services for the public and to support environmental management and the preservation of important natural and cultural sites. Such attention attracts money and expertise to our state. In 1978, then Museum anthropologist Dr. Adrianne Kaeppler's research on the Cook Voyage artifacts established a template for research on pre-contact Hawaiian material culture, created inventories of such artifacts in the world's museums, and forged an exciting exhibit here is Hawai'i. And if for example, you are bitten or stung by an unknown small critter, you can refer to an extremely popular book entitled "What bit me?" co-authored by Gordon Nishida of our Hawaii Biological Survey, which ash received high acclaim from the public.

Museum researcher answer more than 2,000 inquiries each year. In many cases our staff are the only people in the state with the knowledge and experience to answer such inquiries. A high percentage of these inquiries originate with or are referred to us by Hawaiian as well as other state agencies. In one well-publicized case, Museum entomologist Dr. Al Samuelson was contacted by New York state officials to help them identify a non-North American beetle that was ravaging many of their street trees. Why was Bishop Museum called upon? Because we are nationally and internationally renowned as having the most comprehensive collections of Pacific and Asian insects of any museum in the world. We were able to accurately identify the beetle and now specific control measures can be implemented to eradicate it.

Museum researchers serve on at least 25 state committees dealing with agriculture, plant quarantine, and other important state functions. The museum probably has a higher percentage of its staff serving on state committees than any other research organization in the state. This attests to the importance of our specialized knowledge and expertise in assisting the state to meet its regulatory responsibilities.

Museum researchers are important mentors to Hawaii's school children. They also constitute, through unpaid honorary appointments, a significant fraction of the University of Hawaii's graduate faculty in the cultural and natural sciences. This relationship helps attract students and funding to Hawai'i and contributes to the growing reputation of the University of Hawaii for excellence in teaching and research. Museum research expertise is also essential to the development of the Museum's exhibits and education programs that serve the local community and attract visitors to Hawai'i.

Population Density of *Polymita sulphurosa* Morelet (Mollusca : Helminthoglyptidae) in the Yaguanaque Hill, Holguin Province, Cuba: A Conservationist Alarm

Alejandro Fernandez-Velazquez, Adrian Gonzalez Guillen & Ernesto Reyes Maurino

Introduction

Various authors have approached the need of protecting the *Polymita* genus (Jaume, 1943; Fernandez, 1981; Fernandez & Martinez, 1987; Fernandez, 1990; Berovides, 1994; Bidart, *et al*, 1995; Fernandez *et al*, 1995; Reyes & Fernandez, 1997; Gonzalez, 1998, in press), but to preserve the population that still survives, it is necessary to have a better understanding of the damage caused to the geographic distribution area, and the population density.

The description of the genus includes six species (*Polymita picta* Born, 1780; *P. venusta* Gmelin, 1791; *P. versicolor* Born, 1780; *P. brocheri* "Gutierrez" Pfeiffer, 1864; *P. muscarum* Lea, 1834 and *P. sulphurosa* Morelet, 1849) all of which are endangered by the fragmentation and destruction of the habitat and by indiscriminate collecting since the beginning of the 19th century.

The distribution area occupied by *Polymita sulphurosa* is rather small. Its location is the coastal zone and the southern mountains of Sagua de Tanamo, Holguin Province; this *Polymita* is the least known, ecologically, and, at the same time, the most endangered of all the species of the genus in Cuba.

In the present work the estimated values of density in the Yaguaneque hill population are being analyzed; this locality is found, geographically, between Cebolla Bay and Moa, Frank Pais District, Holguin Province.

Materials and Methods

The studied population occupies an area of 2,500 square meters, of which ten parcels have been selected at random. The study was made in October 1995 and January and May, 1996, using the census method applied to the various sized individuals to determine the density of the different examined sites and the average density (Table 1) in each month of our study.

The statistic description of density focuses its attention in the average values (x), the variation coefficient (V.C), the standard error of the mean (Sx), the minimum values (min), and maximum values (max). A simple classification variance analyses was made ANOVA (F), the Kolmogarov-Smirnof test and the adult condition is established according to the criteria of Gould and Woodruff (1978), and Valdes *et al* (1986) in relation to the manifestation of a lip in the rim of the shell's aperture.

Results and Discussion

The statistical differences of density averages between October 1995 (0.27 ind/m^2), January 1996 (0.40 ind/m^2) and May 1996 (0.27 ind/m^2) are not significative (F. 0.979 n.s, $P > 0.05$). There is a small increase (not significative) of the average density in January, but it is a consequence of *Polymita* behavior at this season when the integrated juveniles add to the population density. In October we observed mating individuals, and the population contained more adults (96.8%) than subadults (3.2%); we did not detect any juvenile forms. In this month the population reached the highest average values of shell diameter (19.15 mm), at the same time the lowest variability (variation coefficient 5.91%) coincidental with the age structure distribution of the population. In May the average density decreased again probably for the death of individual adults, severe climatic changes and thicket fires.

It is interesting, from a conservationist point of view, that the attention in the estimated values wide of densities found on the locality, show a continuous diminishing of the variation coefficient and low densities. The population is forced to endure severe environmental conditions probably related to thicket burning and felling of trees. This habitat fragmentation magnified the parcels number with zero individuals per square meter and represents an influence in the low densities of other parcels studied.

The statistics show a reduction related to the variability and the average values of the density in

May 1996. In October 1995 the average value is lower than in January 1996; but in October the population distribution in the studied area is stable, nevertheless in January and May of 1996 we found zero individuals per square meter parcels.

We analyzed the average values of density found in the *Polymita* genus (Berovides, *et al* 1987; Bidart *et al*, 1989, 1992, 1995, 1996 and Valdes, *et al* 1986) and the result is a correlation of the minimal values of our research with the minimal values of *Polymita muscarum* and *P. picta nigrolimbata* (Table 2).

Conclusions

The recent disappearance and diminishing of many Cuban tree snail populations are produced in altered habitats. The case of the infraspecific taxa *Polymita sulphurosa*, the most endangered, is remarkable because of the lack of population dynamics works articles, thus the present study will become the basis for future monitoring work from a conservationist point of view. The average estimated values in the Yaguaneque hill, Holguin Province, Cuba are found between the minimal values registered for the genus *Polymita*. Our efforts are focused in the time scale that the population needs to survive in the upcoming years, notwithstanding the last reducts of *P. sulphurosa* populations are living an alarming drama.

Thanks

Special thanks to Liana Bidart (IES), Nils Navarro (Mus. Hist. Nat., Holguin City), Tom Rice (Of Sea and Shore Publications), Mark Webb and Gillian Walker.

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TABLE 1

Statistical results of densities in Polymita sulphurosa at Yaguaneque hill, Holguin province.
N = parcels number
x = average values of density (individuals per square meter ind/m)
V.C = variation coefficient
Sx = standar error of mean
min = minimum values of density
max = maximum values of density
K-S test = Kolmogorov-Smirnof test
n.s = not significative differences
Anova (F) = simple classification variance analisys

Month	Year	x	V.C	Sx	Min	Max	K-S test
October	1995	0.27	101.13	0.09	0.08	0.84	0.35 n.s
January	1996	0.40	65.88	0.08	0.00	0.64	0.14 n.s
May	1996	0.27	65.63	0.06	0.00	0.48	0.4 n.s

ANOVA (F) = 0.979 n.s
x total = 0.31 ind/m2
V.C = 77.78%

TABLE 2

Total of annual fluctuations and estimated dates in parcels analyzed, minimal and maximum values reported in the genus Polymita.

Polymita muscarum	0.0- 3.60 ind/m2
Polymita picta nigrolimbata	0.1- 1.1 ind/m2
Polymita picta roseolimbata	0.7- 3.8 ind/m2
Polymita sulphurosa	0.0- 0.84 ind/m2

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Octopus giganteus Again

Most of you have read articles in this journal by G.S. Mangiacopra, *et al* (1975, 1977, 1994, 1995) on the subject of *Octopus giganteus* Verrill, 1897. Richard I. Johnson presents a short paper: "The Myth of *Octopus giganteus* Verrill, 1897: A Whale of a Story" in Occasional Papers on Mollusks 5:76: 456-57.

Johnson, who himself had accepted the identification of the Florida Sea Monster as an octopus in 1989, remarks that shortly after the appearance of the last article by Mangiacopra, Raynal, Smith and Avery, Pierce *et al* (1995) concluded, based on electon microscopy and amino acid analyses of tissue from specimens saved from the creature, that the tissue was certainly part of an ordinary great whale. Another mass of tissue, washed into a lagoon in Bermuda in 1988, was also studied and found to be from (according to its amino acid fingerprint) a cold-blooded fish, shark or ray.

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Publications News

Occasional Papers on Mollusks

Published by The Department of Mollusks, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts 02138, the most recent issue is Vol. 5, Number 76 (30 January 1998) and among other articles includes "A New Mussel, *Potamilis metnecktayi* (Bivalvia: Unionidae) from the Rio Grande System, Mexico and Texas with notes on Mexican *Disconaias*" by Richard I. Johnson. A list of previous numbers of this series are available from the Museum - starting with Vol. 1 in 1945. The series is available as full volumes, or separate numbers.

Treatise on Recent Terrestrial Pulmonate Molluscs by A. Schileyko is being published as a series by Ruthenica, the Russian Malacological Journal. Part 1 (now available) (127 pp, 140 taxa) covers the families Achatinellidae, Amastridae, Orculidae, Strobilopsidae, Spelaeodiscidae, Valloniidae, Cochlicopidae, Pupillidae, Chondrinidae, Pyramidullidae. Part 2 (available later this year) with approx. 150 pp, 170 taxa, will deal with the Gastrocoptidae, Hyselodontidae, Vertiginidae, Truncatellinidae, Cerastidae, Enidae and Sagdidae. To quote Schileyko in his preface to Part 1 "Any comprehensive research has at least two main goal: to generalize the main results of investigations conducted since last analogous work (in this case - the admirable monograph by Dr. Adolf Zilch, 1959-1960), and to give some fresh impetus for the next research. Besides, in the course of preparation of this book I have got some new ideas on the philogeny of various groups; these ideas will be discussed in the concluding part. I tried to examine personally as many type species of genera (subgenera) as possible; otherwise I used illustrations and/or descriptions from original or later publications. In total, type species (or, at least, similar to type species) of about 2600 taxa of genus group are described and illustrated in the book, the figures of more than 2000 shells are original. As concerns anatomical drawings, there are altogether over 800 figures; about 450 of them based on my own dissections..."

It is planned that two parts will be issued each year for the next 4 or 5 years. Price of Part 1 is US $30 and includes air mail. Orders, only until July 1998, can be made through the Trophon Corporation, P.O. Box 7279, Silver Spring, MD 20907.

IN REVIEW

MOLLUSCA: THE SOUTHERN SYNTHESIS
Fauna of Australia Volume 5
Published by Australian Biological Resources Study and CSIRO Publishing. January 1998
1250 pages in 2 volumes, color illustrated, hardbound. $295.00 ISBN 0 643 05756 0

Several things immediately impressed me when I received my review copy of this new work. First, of course, was the sheer size and weight - I nearly pulled a muscle carrying the parcel from the post office to my office. Even prior to receiving the volumes I had been impressed by the price tag! But now it was in my hands and I was even more impressed by the amount of reference material contained within these two volumes.

Some 70 authors have contributed to the work and it is the most comprehensive and authoritative treatment yet on the molluscs of Australia: marine, freshwater and terrestrial. Although focused on Australian molluscs, most families covered also occur in the Northern Hemisphere too, making this work useful for reference by molluscan workers anywhere. The amateur may at first feel overwhelmed by the amount of scientific references (7,700 papers are cited), but by using the comprehensive index (with 33,000 entries) you can find out some useful information on nearly any molluscan family or genus you are studying, including some really outstanding line drawings of anatomy, shell structure, etc.

423 molluscan families are covered here. Each with details as to morphology and physiology, natural history, biogeography and phylogeny, history of discovery and economic significance. The fossil record for each is also covered. The volumes are illustrated with 200 color photographs (grouped in the center of each volume), 500 black and white photographs and more than 2,500 line drawings which were especially commissioned by 15 artists.

I have only scratched the surface in my use of this work, but already have added many useful facts to my understanding of our Pacific Northwest molluscs. I simply looked up the family or genus of a local species and then read the section on the Australian relatives. I even gained knowledge accidentally, i.e. when looking up *Panomya*, I somehow looked under *Poromya* and read some very interesting material on these carnivorous bivalves! Not something I intended, but knowledge added accidentally, is still knowledge.

I was also fascinated by the section on the history of malacology in Australia, now knowing a little more about those early collectors and authors. The general section on molluscs is enlightening too in a detailed overview of the phylum.

I would highly recommend this two volume set to any serious student of malacology. As for the amateur collector, perhaps you should check out a copy through your local library, but I don't think you'd go wrong adding it to your own library as well. I know my copy will be well-worn before long.

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Contents

Review by TOM RICE

CEASE PUBLICATION

The board of the Israel Malacological Society has decided to cease the publication of its journals Argamon and Levantina. Issue Number 83 of latter title (January 1998) was the final number to be published.

Dr. L. Raybaudi has announced the cessation of publication of World Shells, probably the most lavish shell periodical ever produced. Advanced age and uncertain health have caused Dr. Raybaudi to halt publication with the final number of 1997. We express our, and many other's, thanks to Gino for his dedication over the years and for enriching our enjoyment of the world of shells!

continued from page 19

for breakfast (packed along with food for lunch and an afternoon snack as well) at an overlook above Honda Bay. We reached Sabang after a three+ hour trip and changed from our jeepney to a pumpboat for the next part of our journey. Our boatmen expertly manouvered their craft out through the breakers and past several points of rock where the surf crashed against the headland and landed us safely at the small sand beach and entrance to the Park. Amazingly these boatmen must have been all of fourteen years old! Seated at picnic tables under shade trees in the Park we feasted on shrimps, fried chicken, kinilaw (like ceviche), fresh fruit and, of course, steamed rice. Short-tail macaque monkeys and large monitor lizards patrolled the fringes of the picnic area, the former looking for anything they could grab and the latter studiously ignoring us completely. Soon we boarded the small panga boat, paddle-powered by a deightful guide, for our trip into the underground river which is the feature of the Park. This is one of the few times I've been on aboat in the Philippines where I was provided with a lifejacket - we also got hard-hats with the explanation that since a zillion bats called the cavern home, we should wear the hat and if we looked up, do not open your mouth! The subterranean river runs more than 6 kilometers, but the tours are limited to a stretch 1.5 kilometers in length. Here the water runs slowly at depths to 10 or 15 meters, while the ceiling can be from several to nearly 50 meters overhead. Centuries of dripping waters have deposited limestone as stalagmites and stalagtites and several have assumed fantastic shapes, many given names such as the pineapple, the cathedral, Mary Magdalane, etc. Our guide pointed out each formation, having the tourist at the head of our boat shine the spotlight the boat carried on each. Bats flew overhead or clung in countless numbers to the cave's walls and ceiling. At one spot, the guide indicated a small crevice which contained a live python. The 45-minute tour passed quickly and we soon returned to the sunlight. Then back to the boat, Sabang, and the three hour ride back to town.

Another interesting tour was to the Crocodile Farm in Puerto Princessa. Here the two endangered species of crocodile (buwaya in Tagalog) are hatched from eggs and raised for release back into the wild, or raised to provide meat or leather. Also on display are other endangered local animals such as the sea eagle and the Palawan Beat Cat (reminded me of a badger). Hundreds of crocodiles are on view, there is a hatchery for the gathered eggs and a hospital to take care of any ill animals.

Our five days slipped by much too fast. We enjoyed the quiet beauty of Princessa Holiday Resort, the helpful and friendly staff

Bivalves of Australia, Volume 2
Kevin Lamprell and John Healy
Backhuys publishers, The Netherlands

Now available, covers families not included in Vol. 1, addendum to that volume, with newly discovered species. 288 pages, 112 plates (89 in color). hard-cover. We understand the price is approx. US$65 plus postage.

OUT OF BUSINESS

We have received word from Peter Bright that **Shells of the Seas** has ceased business. Originally founded by Kirk Anders, Peter took over on Kirk's death. We wish him well in whatever the future holds.

The Sea - a Museum Like Shop is also going out of business. Dick and Yvetta Williams have been operating their unique shop for more than 38 years and without anyone in the family interested, are going to sell out their inventory and retire by the end of 1998. Good luck Dick and Yvetta!

EXCHANGES

I would like to exchange New Zealand stamps for sdhells. I am interested in Patellacea and Cypraeacea. Please write: Les Vuletich; 31 Waimarie Street; Hamilton, New Zealand.